The Builder.

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The Trade Guilds of Europe.

IN May, last year, a delegation from the Merchant Tailors' Exchange of Washington waited upon the Secretary of the State Department, to solicit its assistance in securing, through the Consular officers, information as to the conditions which prevail, and have prevailed for some time, between employers and employed in the several countries of Europe.

The principal points on which they desired information were, as to the existence of schools where boys may learn their trade, the laws by which they are governed, and if the system was successful; whether there are any guilds connected with the trade, and if so an account of the constitution, and the laws and regulations concerning apprenticeship. Before applying for the information it occurred to the Department that it would be equally valuable to the other trades.

Instructions were then sent to the various consuls to supply the required information, and what they might consider necessary for the full illustration of the conditions and relations which exist between the employers and employed in their districts.

The result is a volume of over 300 pages, containing full information on the various subjects. Taken together with the previous Report on Labour in Europe, which contains the rates of wages in all trades, hours of labour, cost of education, living, &c., and social habits, it presents as good a description of the state of the industrial classes of Europe as can be got.

Some of the consuls, judging by the work, have made no reply; others say there are no such institutions in their district; others give a very brief description; but these cases are exceptions. Full information is given on guilds, trade-unions, apprenticeship, schools, technical education, customs and laws of trade, social habits, and other topics, and the two works should be in the hands of all interested in industrial pursuits.

Among its contents are the trade regulations of the German empire; a valuable description of the Russian *artels*, or associative labouring societies; the rules of ten trade-unions of Scotland, including the masons, carpenters and joiners, and plumbers; and the conclusions of the second Report of the English Royal Commission on Technical Instruction, with the recommendations of the Commission.

The Report from Leipsic is devoted to the history of guilds, and contains several interesting features. None of the other Reports treat of the historical part of the subject.

According to Walford, trade guilds "existed in England at a very early date. There is good reason for supposing that in the tenth century there was an order of monks in the north of Germany whose chief occupation was commerce, and who probably encouraged and protected the guilds. These were known as the Grand Masters of the Teutonic orders. They founded a branch in London during the reign of Edward the Confessor, under the title of *Gildhalla Teutonicarum*. These merchant guilds are believed in many cases to have arisen quite independently of the towns wherein they were located; but in other cases they seem from the beginning to have been identified with the town and its corporate government. It seems clear that in early times the craftsmen were frequently members of the merchant guilds. The strict separation which at a later date existed between the merchant and the craftsmen did not then prevail, and probably only came about by degrees." But according to Brentano, the craftsmen to be admitted to the merchant guild had to be in possession of the full citizenship of the town, which implied the possession of land.

The men who in towns were citizens by the possession of town land were often also traders, and early formed for their protection a guild *mercatorium*, when the towns obtained charters; by their influence they obtained as one of its conditions that the men of the place should also have their guild merchant. Thus the citizens and the guild became identical, and what was guild law often became the law of the town. In great cities, where there were no merchant guilds, there the craftsmen early asserted their independence. Many craft guilds existed in Italy from the ninth to the twelfth century, the heads of which possessed a share in the government of the community. But in England and the North of Europe the guilds merchant, having become wealthy, excluded the handicraftsmen. From the union of these latter arose the craft guilds who gained the supremacy in the struggle for liberty. On the Continent the struggle was much more severe than in England, because the craft guilds were subject to greater oppression. In England the two guilds usually existed side by side until the increasing importance of the craft guilds and the decay of the merchant guilds led to their union, and so the craft guilds formed part of the constitution of the town.

The constitution of trade guilds was similar to that of others. They appointed a master and other officers, made ordinances and regulations for their government, the maintenance of their craft and its customs, including rules against fraudulent workmanship, and the punishment of members infringing the rules; they assisted the members in sickness and adversity, settled all disputes, and had entire control of all matters relating to trade. At first craft guilds were voluntary associations; as they gradually increased in importance and power the terms of membership were altered, charters were conferred upon them confirming their privileges and rights, and no one was allowed to practise his trade who was not a member of the guild. The same causes which led to their rise also contributed to their fall. Growing up by their side was a poorer class who were excluded from citzenship; to these were added craftsmen who were not members of the guilds. In course of time they made their influence felt, and as they rose so the craft guilds decayed. The influence of the Reformation, the changed state of society, the growth of capitalists, the admission to the guilds of those who had little or no connexion with trade, slowly but surely led to their fall; and these societies, once so powerful, now where they exist do so only in name and for very different objects.

The consular report from Leipsic consists of a history of trade guilds founded on notes supplied by Mr. Mothes, an eminent Saxon architect, who is preparing an exhaustive work upon the guilds of the world.

It commences with a description of the early societies analogous to guilds, which are described as being founded through the endeavours of the toiling masses to free themselves from the galling yoke of oppression, gives an account of the Roman *collegia opificia* down to the fall of the empire, and of the way in which they spread through those countries that were under Roman rule, and in a comparatively brief space gives a history of trade guilds in Germany down to their abolition in 1869, and of which we give some account, commencing with the conquest of Constantinople.

"When Theodoric the Great conquered that city he found some guilds existing there. The *singularium artium magistri* (masters of special arts) are mentioned often during the reign of the Ostrogoths. The title of *magister* was given to every full privileged member of a guild during those those days.

In 590, Thudelinde, Queen of Lombardy, gave certain privileges and rights to the *magistri* Comacinis (stone-cutters) on the island of Comacina, in the lake of Como. This *magisterium* existed until the fall of Didier, and from 644 to 724 it was regulated by special laws. Besides the *magistri* Comasinis there is evidence of the existence of the *magistri casarii* (house builders), and the *magistri Antelami* (carpenters of Antelamo). When Charlemagne invaded Lombardy he con-

firmed the privileges of the Lombard guilds, and gave to the *mauern* (masons) the rights enjoyed by the free Franks. Long before this Lombard artisans had emigrated to France and Holland, and carried the guild system with them, so that under the comparatively liberal government of Charlemagne they flourished better than for centuries. This is a different view to that taken by other writers, who assert that Charlemagne and his successors forbade the existence of guilds and societies, and decreed the severest punishments against those entering into such combinations.

The clericals and monks now began to engage in the various trades, and soon exercised great influence over the different branches. In 738, the *pes publicus* (the royal standard foot measure) of Liutpand did not satisfy the monks, so they established their own measure, which was called *pes de munichis* (monastic standard foot); and from 914 to 946 the Benedictines strove in vain to prohibit the masons of Lombardy from constructing convents and other religious institutions. At this point began an obstinate struggle of the guilds against the clerical workmen, and also against the serfs and bondmen employed by the nobility. The struggle was bitter, and was felt throughout the Continent. The efforts of the clericals to prevent the guilds from obtaining employment on religious structures did not succeed. In 924 Bishop Ulrich, of Liege, could not find enough architects among the clericals, and was, therefore, compelled to employ members of the guilds. Evidently the word "architect" is here used for or synonymous with "builder." In 1090 Manegold, the architect, was compelled to join a monastic order before he could secure the contract for building the convent at Marbeck. In 1099 Bishop Conrad, of Utrecht, prevailed upon the son of the architect Pleber to betray the secrets of a guild. A short time afterwards the son was put to death by the father for his treason.

From this time to the end of the twelfth century various craft guilds were formed, and had increased so much in importance and power, and so strongly supported civil liberty, that from 1200 to 1219 the Emperor Frederick II. endeavoured to suppress them; but they still continued to exist, and in 1232 the Imperial restrictions were removed. During the struggle the guilds were severely treated. At Brunswick, in 1220, six guild-masters were burned alive and six banished.

In 1230 the guilds of Magdeburg, which had grown powerful, were broken up by royal order, but they were soon re-established with greater privileges and rights. A similar case occurred in 1231 at Wurzburg.

In 1272 Rudolph of Hapsburg recognised by decree the rights of the guilds to exist, and gave them the privilege of bearing arms.

During the thirteenth and fourteenth centuries Magdeburg was the scene of the fiercest struggles of the various guilds. In 1330 they secured several seats in the town council, but the next year they were deprived of their recently acquired privileges and the whole of the masters burned alive. After years of oppression they again secured their rights, and took their places in the town council, and the influence thus gained was felt also in other districts, and helped to secure many advantages to the guilds of neighbouring provinces. Several masters of the guilds were admitted to the town council of Zurich in 1335, but only after a severe conflict.

From 1368 to 1372 members of the guilds are found in the town councils of Aix la Chapelle, Cologne, Dartmund, and Mayence. With the change in the external condition of the guilds occurred a change in their organisation.

It was not until 1150 that the guilds had any voice in the election of the masters. Previously to this the masters were chosen in the cities by the town councils and in the country by the bishops and princes, and at that time no one was allowed to be a member of the Strasburg guild who was not of free and legitimate birth and could prove his ancestry for four generations. Later, illegitimate persons were admitted to membership.

But in 1150 the members of the Strasburg guilds had the right to reject the masters imposed upon them. In 1190 members of the guilds elected their own masters. Laws could only be enacted by the majority of the members, and candidates for membership admitted in a similar way.

But towards the end of the fourteenth century had come a change. The increase of prosperity had affected the masters of the guilds. The old Strasburg rule of not admitting illegitimate persons to the guilds was revived. Some of the guilds excluded the children of weavers, barbers, shepherds, millers, revenue and tax collectors, musicians, because they were not free born. The advance from fellow to master was rendered more difficult. The right of suffrage was taken away from the fellow. Formerly the candidate for admission to the guild had to execute a piece of work which had to be submitted to all the members. The rule was altered, and the masters assumed to themselves the right to judge the work submitted and to accept or reject any candidate they pleased. Each fellow who aspired to a mastership had to work one year in the place where he desired the mastership, and upon admission had to pay a certain sum of money. Disputes among either the fellows themselves, or between the fellows and the masters, were decided by the masters alone, and, not as formerly, by a committee of the two. Every member had to submit all his quarrels to the masters before applying to the civil or criminal courts for redress. This court within the guilds existed in some places as late as 1840. At this date in Hamburg the lodges of the masons and stone-cutters could inflict the punishment of death, and could not be interfered with by the criminal courts.

Most of the masons and stone-cutters united their lodges and formed a grand union organisation. This union, under the great lodge of Strasburg, comprised all the mason and stone-cutter guilds of England, France, Germany, Hungary, Italy, the Netherlands, Portugal, and Spain. The chief master, residing at Strasburg, in 1263 was subject to the authority of the Archbishop of Milan and of the Pope. No mention is made of the union of German building lodges in 1452.

At the Reformation, the fellows of the guilds were in a state of semi-serfdom. The troubled times which followed, especially the Thirty Years' War, destroyed, in a measure, the power of the guilds, and debased the standard of German handicraft work. The workmen found employment difficult, and entered the military service. When the Thirty Years' War ended, German handwork had sunk so low as to be the subject of ridicule. In 1520, Francis I. of France was obliged to send to Germany for gunsmiths, locksmiths, &c. One hundred years later, France excelled Germany in all kinds of handwork. After the peace of Westphalia, Germany had to depend upon French models in nearly all the branches of handwork. At this time the guilds had lost all their influence. Those of the masters that had seats in the Town Councils were rich persons, manufacturers and not handworkers. Two guilds only retained their ancient position, the Merchants' Guild and the *Universitas*. The other guilds still clung to the organisation adopted in the beginning of the fourteenth century. The little power they had left was exhausted in disputes with other guilds or with workmen who were not members of any.

The carpenters quarrelled with the joiners who made staircases; the joiners quarrelled with the carpenters who made doors; the glaziers quarrelled with the joiners and carpenters who made sashes out of soft wood; the joiners quarrelled with the glaziers who made sashes out of oak. The plumber was allowed to sell lamps, but not lamp-chimneys, globes, or wicks. The physician could prosecute the barber who prescribed a medicine, but the barber could not bring an action against a physician who bled or applied bandages. The *Universitas* would always sustain its members, among whom were the apothecary and physician. Either of them could prosecute the druggist, but he could not prosecute the apothecary.

In course of time the influence and power of the guilds sank even lower. The masterships became hereditary, the fellows thus lost hope and energy; the apprentice became mainly a domestic, and learned little of his trade. At the beginning of this century they were entirely demoralised and disorganised.

In 1815 thousands of German artisans had emigrated or gone into other pursuits. Great efforts were made to revive commerce, but nothing was done for handiwork, which had deteriorated through the making of furniture, bronze articles, pottery, &c., by machinery.

In 1847 numbers of the members of the guilds joined political societies in the hope of bettering their condition. This naturally weakened what little influence the guilds had left.

When the revolution was suppressed in 1849, the workmen's unions were dissolved, but continued to secretly exist. At the same time, factories began to be extensively built, and seriously affected the condition of the handworker. Both masters and fellows of the guilds objected to the use of machinery. The former tried to compete with the factories by reducing the wages of the latter, who eventually resisted, and much trouble ensued.

The tendency of the age was towards the suppression of the guilds, and the establishment of general free trade. This took place in Saxony in 1860, and in Prussia in 1868. The guilds were partly dissolved, while the rest of them were restricted in such a way that they soon ceased to exist. A number of fellows established themselves as masters, but, being without either ability, education, or capital, they could not succeed and most of them became bankrupt. The workmen who did not become masters, having lost their guild connexions, gradually became Social Democrats and anarchists. Apprentices who were compelled to pass certain examinations would not study, and deserting their masters before their time was out entered the service of other masters as journeymen, no certificate of proficiency being required. Manufacturers took young boys as apprentices, and instructed them in a careless manner. Thus in a machine factory an apprentice was taught how to make rivets, and received a certificate as a locksmith. The tailor established as a builder, and the mason as a maker of implements.

At the present time there is a movement for the general revival of guilds. Laws to this end were enacted in 1878, 1880, and 1883; but these laws, while they impose certain duties on the guilds, do not give them any rights or privileges. Guilds under such circumstances are of no use, as no one will belong to a guild which is loaded with obligations and restrictions, but enjoys no privileges.

Their history in the remaining part of Europe is very similar. In France they existed from before the twelfth century, were re-arranged in 1673, and suppressed in 1791. They possessed halls, almshouses, and chapels, but not much real property. At their suppression the whole of their property was devoted to State purposes, but compensation was given, in some instances, to existing members.

In Belgium the guilds were suppressed, and their property confiscated in 1794. In the Netherlands the guilds were suppressed in 1798, and their property vested in commissioners. In 1820 this property was sold, and the proceeds applied to the relief of indigent members of the suppressed guilds and of the poor of the commune. In Switzerland some of the guilds have dissolved themselves, and either divided their property among their members or applied it to public purposes, particularly education; others exist under the name of abbayes, and possess considerable property. In Austro-Hungary the trade guilds were abolished, and their monopolies repealed in 1859. In their stead local bodies representing the masters and journeymen were established, apparently trade councils and tribunals of arbitration. The halls of the trade guilds were sold, and the proceeds given to the new associations. In Norway and Sweden the old trade corporations were dissolved in

1846. In Italy the ancient guilds were abolished with few exceptions in the present century before the union of the kingdoms. After the union, in 1878 and 1879, acts were passed abolishing all monopolies. In Spain many of the craft guilds still exist as benefit societies and trade councils. In Portugal the craft guilds were suppressed in 1834. In Russia trade guilds were introduced by Peter the Great in imitation of similar institutions in Germany. They had but little success, and after a fitful existence up to 1870, under certain conditions, trade was made free to all. In Turkey there are believed to be many institutions resembling the craft guilds of the Middle Ages.

In England the history of guilds is not so eventful as in many of the Continental nations. They were never much subjected to the tyranny or the ruling powers, and did not concern themselves with affairs of State; their struggle for freedom was for the right to participate in municipal affairs and to possess control of matters relating to their trades. The security against foreign invasion, the absence of power in the sovereign to enforce his decrees, and his having to rely upon the people's not having the means of resistance (for when resistance was arranged it was often successful), the aristocracy not being an exclusive caste, the Parliamentary system in which the guilds were represented, all tended to diminish the jealousy between classes, and to give to the individual some sense of security. We meet in English history often complaints of exactions and oppressions, but these are comparative terms. What was termed oppression in England might in other countries be regarded as not deserving the same designation. The numerous contests in England that took place for the throne were in reality contests between one part of the people against the other, or were regarded by them with indifference; and, on the whole, they were pretty equally divided.

After victories there were the usual punishments, and cruelties were inflicted on the defeated party, but they were confined to those who took part with either side. Whoever succeeded, no change in the institutions of the country was made, and some historians assert that six weeks after the most violent conflict there was not a trace of it.

The history of guilds in England is the history of its municipal life, of which there is no better example than that of London. The earliest information we have of a craft guild in London was that of the weavers, who had a charter from Henry I., and which was confirmed by Henry II. From 1154 to 1189 there are records of eighteen guilds who were fined according to some authorities for existing without a charter, and, according to others, for having neglected to pay the tax which all guilds were liable to. From then till the time of Edward III. their existence is one continued struggle with the merchant guilds and citizens and each other. In the time of Edward II. was issued an ordinance that required every citizen to be a member of some trade or mystery, and another ordinance of 49 Edward III. transferred the right of election of corporate officers and members of Parliament from the ward representatives to the trading companies. Their victory was now assured, and for many years the guilds possessed both the municipal and political power of the city.

What was the precise connexion between the companies or guilds and the corporation is difficult to say. The ordinance of Edward II. required freemen of the City to be members of one or another of the companies. By the ordinance of 49 Edward III. the companies were to nominate the members of Common Council, and the persons so nominated alone were to attend at elections. An ordinance of 7 Richard II. restored the election of common councilmen to the wards, but corporate officers and representatives in Parliament were elected by a convention summoned by the Lord Mayor from the nominees of the companies. An Act of Common Council of 7 Edward IV. appointed the election of mayors, sheriffs, &c., to be in the Common council, together with the masters and wardens of the companies. By 15 Edward IV. the masters and wardens were ordered to associate themselves with the honest men of their mysteries and come in their best liveries to the elections; that is, the franchise was restricted to the liverymen of the companies. We thus see the two bodies at one time united, at one time the companies electing the corporation, at another the corporation controlling the companies. Well may the City Livery Companies Commission say that it is no part of their duty to dissect this strange and composite constitution.

The view taken by the Commission is "that from about 1314 the guilds were a municipal committee of trade and manufactures. Soon after they became incorporated, and became, while retaining their position under the municipality, an institution in the nature of a State department for the superintendence of the trade and manufactures of London. By the commencement of the Tudor period they had become to a great extent an obsolete institution as regards trade superintendence. For a long time afterwards these bodies were an important element in the City. In the provinces the craft guilds have almost disappeared; the guilds of London have continued in existence and have never been interfered with in any way by the Legislature with the exception of the Charity and Endowed Schools Commission. The condition in which they have existed for the last two centuries is that of societies, the only purposes of which have been benevolence and entertainments."

But the history of guilds, and especially of trade guilds, has yet to be written. The works upon the subject are nearly all for the purpose of supporting some theory, or taking some particular view,—antiquarian, democratic, or political. Attempts have been made to prove trade guilds to be benefit societies, clubs, monopolies, provident institutions, trade unions, &c., and for every page of historical matter or fact there are several of disquisition and speculation. The most complete work on guilds in English is the recent one of Walford, which contains much valuable and interesting information relative to the guilds of London and the provinces. There is much need of a work written from a social point of view, which would give the history of these societies, the nature and amount of the control they exercised over trade, the regulations they made, and their means and modes of enforcing them, and their relative position to the communities where they existed, which should be free from speculations as to their character, and not too much devoted to their municipal and political struggles. This information can now only be acquired by a tedious search through histories, general and local, articles on municipalities, reports of commissions, pamphlets, &c., at a great expenditure of patience and time.

THE LAW AS TO LINE OF FRONTAGE.

THE great value of the House of Lords as a Supreme Court of Appeal has been lately well exemplified by the manner in which they have ended the long-existing uncertainty in regard to the fixing of the general line of buildings in a street under Section 75 of the Metropolis Management Amendment Act, 1862. Without quoting the whole of the section, it is enough to remind our readers that it enacts that no building "shall be erected beyond the general line of building in any street" without the consent of the Metropolitan Board of Works. Further on the same section says that "such general line of buildings is to be decided by the Superintending Architect of the Metropolitan Board of Works." If any one offends against this rule, by building beyond the line, then complaint is to be made to a magistrate, who may order the demolition of so much of the building as is beyond the "general line so fixed as aforesaid." One would have supposed that the enactment had been clear enough, and that all that the magistrate had to do was to observe the line fixed by the Architect, and see if the building complained of goes beyond it. But by some legal ingenuity the point became confused, and in the last edition of Woolrych's "Metropolitan Building Acts" the law is thus stated:—"The certificate of the Superintending Architect is not absolutely conclusive, but the magistrate is entitled to judge for himself whether the line fixed by such certificate is, in fact, the general line of buildings in the street." Therefore the decision of a person skilled in regard to the superintendence of buildings, and quite impartial, has to be subject to the opinion of a person who, however competent he may be as a lawyer, cannot be considered to be so competent to decide what is the general line of buildings in a street as the Superintending Architect of the Metropolitan Board of Works. In 1864, in the case of St. George's, Hanover-square, *v.* Sparrow, we find the law as laid down in the above work first enunciated by the Court of Common Pleas. We are not now concerned with the reasons for that judgment, it is sufficient to state the result of it. But in 1867 came the case of Bauman *v.* The Vestry of St. Pancras, when the Court of Queen's Bench took an opposite view. Here were two directly conflicting decisions; and then in 1871 came Simpson *v.* Smith, in which the Court of Common Pleas (differently constituted, indeed) adhered to the decision of the same Court in 1864. So matters remained till the case of Spackman *v.* The Plumstead Board of Works, in which Mr. Marsham, the police magistrate, decided that he himself must settle what was "the general line of buildings," and dismissed the summons, because, though the buildings went beyond the Architect's line, they did not go beyond what was the true line, in his opinion. This decision was reversed by the Queen's Bench Division, and their judgment has since been upheld by the Court of Appeal and by the House of Lords. Therefore, this most important question, which affects so many interests in the metropolis, is now set at rest once and for all. The only reason for astonishment is that the question could ever have been decided otherwise; the reasons in its favour are so overwhelming that it is a kind of puzzle how such able judges as decided to the contrary could have come to the conclusion which they did. "The words of the section," said Lord Watson in the House of Lords, "have one meaning, and one only, and upon these leading words which enact the prohibition, which constitute the offence, and which direct the remedy, there is no ambiguity whatever. They have a plain and ordinary meaning, and, as far as I see, they have no secondary meaning such as that suggested. The suggestion is that in the language which confers on the magistrate jurisdiction to try the complaint, you can find expression which may be amplified so as to override those other words enacting prohibition, defining the complaint and giving the remedy. And what are these words? 'If at the time and place appointed in such summons the said complaint shall be proved to the satisfaction of the justice.' Now, it is said that you may read these words as signifying that the justice is to re-try everything which has been decided before." Lord Watson then proceeded to point out that the previous plain words of the enactment could not be thus controlled. He concluded by the sensible observation that "a decision by a gentleman in the position of the Superintending Architect of the Metropolitan Board of Works is not likely to be less favourable to the interests of all parties concerned, nor is less likely to attain the ends of justice, than a series of decisions by a number of different district magistrates." Such has been the course, and such the conclusion, of this important phase of metropolitan building law.

Surveyorship.—On Tuesday last the Exeter Corporation of Guardians met to appoint a surveyor. On the voting being taken, of the nine candidates, Messrs. Wilkinson & Warren, of Exeter, architects and surveyors, received a majority of fourteen votes, and were declared elected.

NOTES.

WE print elsewhere the memorial presented by the Institute of Architects to the First Commissioner of Works on Monday last in regard to the treatment of the site of the new War Offices, and the block-plan proposed by the Institute. The deputation made a case for their view which is quite unanswerable, except on the barest grounds of economy, and this seems to be the view taken by those outside the profession who have given attention to the matter. The *Pall Mall Gazette* observes:—

"The rival plan which the Royal Institute of British Architects submitted yesterday to the First Commissioner of Works for the new Admiralty and War Offices will not be adopted,* but will be interesting as another record of what London might have been if it cared to pay for appearances. The plan of the Architects is better than that of the Government at every possible point; it widens Whitehall, it prolongs the Mall, and it avoids dwarfing the Horse Guards."

As we have repeatedly said, it is unworthy of such a country as England to build a great public building in a restricted and beggarly manner, and to lose an opportunity for permanently beautifying an important site in its capital, on mere monetary considerations. Those who attended the deputation, perhaps, carried away with them certain not very reassuring convictions as to the possible narrowing effect on the Ministerial mind of the interposition of the permanent irresponsible functionaries who have so much power of string-pulling in the direction of their own restricted ideas. We must congratulate the *Times* on showing signs of coming out of Egypt, that journal having actually devoted a leader to the recommendation of an artistic improvement formulated by a body of architects. After this, we may even hope that the *Times* will one day find out the truth about Lord Grimsthorpe and his attainments as an architectural artist.

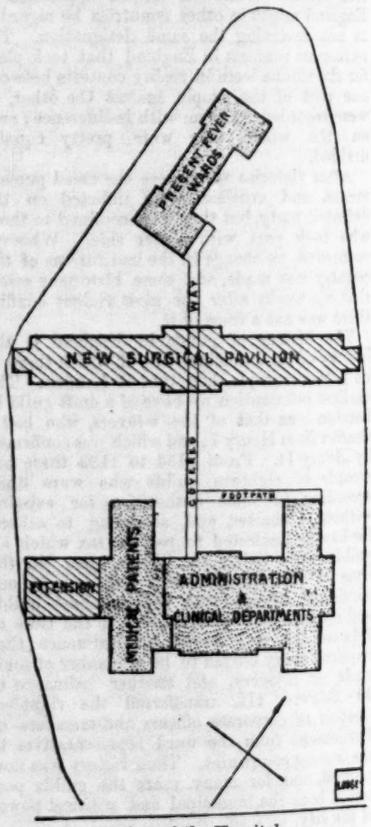
THE debate on February 25 on the Tenure of Houses (Ireland) Bill cannot be passed over without notice. The object of the Bill was, shortly stated, to introduce fixity of tenure and fair rents to Irish towns. But the debate broadened out into one upon urban tenure in England and Scotland, and resulted in the promise of the Government to appoint a select committee to consider the question of leasehold tenure in towns. Therefore, the committee will certainly consider the question of leasehold enfranchisement. The cause and the result of the debate show that there exists a dissatisfaction with leasehold tenure in towns; we have never supposed that the dweller in towns would be content to see his brother in the country obtain compensation for improvements and not make an effort to obtain it for himself. The debate is a sign of the times; amid much that is unsound and unhealthy agitation, there is visible a wholesome tendency to make the lessee a permanent occupier at a fixed rent. "The certain rent in perpetuity which could never be raised," as Mr. Macdonald, the late Conservative Lord Advocate, described the Scottish system, will, in all probability, be the solution at which we shall arrive in England, combined with a system of yearly tenancies. Be that as it may, this debate is a certain sign that things will not remain as they are.

LAST year we commented on the case of Melliss *v.* The Shirley Local Board, in which Mr. Justice Cave decided that the fact that Pym, one of the parties to the contract with the Local Board, was the surveyor of the Board, did not make the contract void, but merely rendered him liable to penalties under section 193 of the Public Health Act, 1873. The unanimous judgment of the Court of Appeal is published in the current month's number of the Law Reports. That judgment reverses Mr. Justice Cave's decision, and decides not only that the officer or servant of the local authority is liable to penalties under section 193, but that the effect of his being interested in the contract is to render it void. There are no express words in section 193 making such a contract void, but the reasoning on which the Court of Appeal reached their conclusion is easily seen from Lord Esher's judgment. "This rule of interpretation has been laid down, that although a statute contains no express words making void a contract which it prohibits, yet, when it inflicts a penalty for the breach of the prohibition you must consider the whole Act as well as the particular enactment in question, and come to a decision whether the penalty is imposed with intent merely to deter persons from entering into the contract, or whether it is intended that the contract shall not be valid at law. It seems to me that the intention of the Legislature was that such a contract should not be entered into so as to be legally valid." The result of this case, therefore, is a kind of double prohibition against servants of local authorities entering into contracts with their own masters,—firstly, the penalty; secondly, the invalidity of the contract. There can be little question that the judgment is in the right direction, and will put a stop once and for all to such contracts as were the cause of the litigation.

THE complaints of excessive railway charges are so numerous, and practical propositions for reform so few, that it is quite refreshing to have for consideration a suggestion of the latter description. Mr. Jefferds, C.E., an authority on railway matters in America, offers such a suggestion with every confidence in its merits, though he confesses that he does not anticipate a favourable reception for it. Our railway managers always declare that working expenses are at the lowest possible figure, but it is nevertheless in the "operating" department,—as Mr. Jefferds terms it,—that he considers reform is needed. His contention is that we are too conservative in our method of constructing rolling stock, and that the adoption of the "bogie truck" system would cause an immense saving. It is asserted that our carriages and wagons, being stiff and rigid in construction, create an amount of friction which would be greatly lessened by the lighter and more flexible "bogie" system, allowing of a great reduction in the amount of power required for haulage, and consequently in the working expenses. Many of our long passenger coaches are constructed on this principle, which undoubtedly facilitates their running, and lessens the amount of motive power necessary,—the benefit being, of course, principally apparent in traversing curves. The percentage of our working expenses to receipts is less than in America by some 8 per cent., but as they charge lower rates than we do, and pay so much more for labour and fuel, the difference should be greater than it is. The non-adoption of the system advocated is confidently ascribed to simple prejudice, but we can hardly think that there is no other obstacle in the way, as our managers have a reputation for studying economy in every direction, and they would hardly allow prejudice to hinder a beneficial reform. Anything which would allow of a reduction in rates should be hailed with satisfaction, for an increased amount of traffic would result, which would benefit both the shareholders and their customers.

FROM a recent report of the Peabody Trustees it appears that the average cost of the buildings erected by the trustees is 60*l.* 10*s.* 2*d.* per head, so that a family of four persons costs a capital sum of 242*l.* to house, which is a much larger amount than what is ordinarily expended by the speculating builder. As regards the acquisition of land, the trustees have been singularly fortunate, three sites, namely, those in Glasshouse-street, Bedfordbury, and Wild-street, having been sold to them by the Metropolitan Board of Works for a sum which leaves a clear loss of 235,808*l.* or more than a quarter of a million, to the ratepayers. Taking land and buildings together, a family of four persons costs 510*l.* to house. A warning note is struck in the statistics of the mortality among the inhabitants of these dwellings. In the year 1884 the deaths per thousand of the total population of the Peabody Buildings were 19·10, as compared with 20·34, which was the London rate; but in 1885 the death-rate in the dwellings was actually one decimal point above the general rate of mortality in London, the figures being 19·60 in the Peabody Buildings and 19·59 for the whole of the metropolis. It would seem from these facts that, while the death-rate of London has declined steadily since 1876, the death-rate in these model dwellings has increased since 1881, from 17·22 to 19·60 per thousand. It will be probably found that this increase is due to increased density of population, a point upon which we have frequently insisted.

THE Aberdeen Royal Infirmary, having been reported on by medical experts as structurally defective, and not at all equal to modern ideas, the managers recently employed Mr. H. Saxon Snell to suggest a scheme for remodelling and extending the present buildings. Mr. Snell, having visited Aberdeen, now recommends as the most economical method of utilising the present site and buildings to the best advantage:—(1) The erection of a new pavilion of four floors for surgical cases; the extension of the west wing of main building (three floors) for medical cases; and (3) an alteration of the present typhus-fever house, so as to adapt it as a post-mortem room, mortuary, pathological museum, and erysipelas wards. All other zymotic diseases are to be excluded from the Infirmary, and the accommodation after reconstruction would, besides



Plan of the Hospital.

the administrative department, be as follows:—Surgical cases, 100 beds; medical cases, 80; eye diseases, 16; venereal diseases, 16; erysipelas, 8; spare ward, 16,—total number of beds, 236. Mr. Snell estimates the total cost of these proposals (including other details which we cannot enter on) at 25,000*l.* The managers have no surplus funds for building, there being an adverse balance last year, and, in fact, generally a deficit on each year's account,—a very usual circumstance with institutions depending on voluntary contributions. Mr. Snell's scheme is, we understand, likely to be objected to on medical grounds, and the proposal to construct an entirely new hospital on modern principles on a less re-

* Our contemporary means that the House of Commons will not vote the money for it; but we hope better things.

stricted site in the suburbs urged. The only objection seriously preferred against this is the difficulty of obtaining funds.

THE site for the erection of the new War Office and Admiralty buildings has been begun to be cleared, in spite of Lord Stratheden's appeal to the Government that nothing should be done until the result of the interview between the Royal Institute of British Architects and the First Commissioner of Works had been reported to the House of Commons. The houses in Spring Gardens Terrace facing the park have been partly demolished, and the quaint little gunner's house at the north-west angle of the Horse Guards Parade has been entirely removed. The other houses in Spring Gardens will shortly follow.

THE new western façade of the cathedral of St. Maria del Fiore, at Florence, is proposed to be further adorned by three bronze doors, and designs are invited, and three premiums are offered, viz., one of 4,000 francs (160*l.*), for the central door and two of 3,000 francs (120*l.*) for each of the two lateral doors. It is not stated whether the successful competitors will be entrusted with the carrying out of the work, nor what amount of money is proposed to be expended; and in default of this information foreign artists will perhaps do well to abstain from competing. The designs are to be sent in by the end of October next, and the premiated designs are to become the property of the promoters of the competition.

IN last week's *Athenæum* Mr. Magnússon suggests a very clever scheme for the planning of a library capable of indefinite extension of capacity, as required by the gradual increase in the number of books. His idea is to have a central circular reading-room with a dome and lighted by clear-story windows, and around this a range of book galleries in the form of a spiral, with lower walls, and lighted from above. The spiral gallery could be carried out as far as necessary for the requirements of storage when the library is first founded, and could be increased by the continuation of the spiral outwards as often as it might be found necessary to enlarge the space, without any more interference with the existing building than would be involved in pulling down the terminating cross wall of the spiral and rebuilding it at the end of the new extension. Communication between the spiral galleries and the central reading-room would be provided by eight passages radiating from the centre and piercing the spiral. Architecturally speaking, the termination of the spiral by a "blunt end" would always remain an awkward feature to the eye; but in every other respect the appearance of the whole externally might be made pleasing enough; and on practical grounds the idea is well worth attention, providing a simple and inexpensive means of enlarging the book galleries *ad libitum*, in proportion to the increase of the contents of the library. Architects ought to be grateful to Mr. Magnússon for a new idea.

"ONE of the most difficult forms of thinking is to make a plan," said Mr. Goschen, in his admirable address at the Mansion House on "Hearing, Reading, and Thinking." His remarks were not addressed especially to architects, but no doubt architects were among his audience, and they would recognise the truth and force of the dictum. They are, it is true, assisted by the "pen and paper" which Mr. Goschen himself finds such desirable aids to the process of thinking, and "a great statesman" finds indispensable. But the fact remains that the effort of thinking out a really good plan, one "with a backbone," as Mr. Goschen happily expresses it, addressed logically to a given end, and unswayed by accidental circumstances of detail, is an intellectual effort of no mean order, to which the public attach quite insufficient weight.

FROM a letter we print in another column, addressed by the Leeds and Yorkshire Architectural Society to the Town Clerk of Sunderland in reference to the proposed Municipal Offices competition, it will be seen that there was ample reason for the criticism we have already made as to the arrangement of charging 5*l.* for the conditions without giving a word of information as to their probable nature. The Leeds and Yorkshire Architectural Society have paid the fee, or one of them has, and have found that architects have been invited to pay 5*l.* for ascertaining that they are to be mulcted of ten per cent. of their proper profit on the work, that no professional referee has been appointed, and that the time is too short. The Corporation may reconsider all these points; but unless they do, some men who may have been foolish enough to comply with the terms of the advertisement will unquestionably have "spent their money for that which is not bread."

MOULDINGS.*

BY GEORGE AITCHISON, A.R.A.

GRACEFUL, well-designed, and effective mouldings give the same distinction to a building that proper and well-chosen words do to language.

In grouping mouldings together care must be taken to make the divisions in harmonic proportions, to contrast the great with the small, the strongly-curved with flat surfaces, or with other mouldings whose curves are nearly flat, so that the group may be like a well-balanced and harmonious sentence.

A sentence is but a small piece of the whole work, and only helps to make up the impression to be conveyed, or the emotion to be raised; it is only a humble minister to the whole plot; but you may have noticed in reading a story that, if the plot is the only excellent thing in it, you probably read it but once,—certainly but a few times; while, if the language be terse, harmonious, and expressive, though you may have learned the plot in your childhood, you read the work again and again with increasing zest.

In the poets, where rhythm, as well as choice words, always exist, we occasionally get those—

> "Jewels five words long
> That on the stretch'd forefinger of old Time
> Sparkle for ever."

So in architecture we sometimes get a group of exquisite mouldings. We even now sometimes see a cast of Greek mouldings treated as one of the treasures of a house. Architects should feel the beauty of a moulding, as a master of language feels the beauty of a word.

R. Hall said, "I could think of that word 'tear' till I wept"; and when this sentence from his sermons was read to him, "Grace penetrates the soul as the sun penetrates the clouds," he said, "That is not mine; I never used a word in three syllables when there was a more expressive one in two; the word I used was 'pierces.'"

The only architects I know who must have had this feeling towards their mouldings are the Greeks.

If you consider the long continuance of the Doric order; that the only changes made in it were by delicate variations of the echinus, and in the proportion of the order, you *must* feel the love for exquisiteness that animated the architects and charmed the people of Greece. You feel that the Greek architects had the same admiration for their predecessors' master-pieces as Michelangelo had for the dome at Florence. "I will not make one like you, and better than you I cannot." We picture to ourselves Ictinus, who hoped to get the next temple to design, watching from dawn to eve the light come and go on the capitals of the Theseum, and lying awake at night picturing to himself how he could improve the proportions, and get a more exquisite curve in the echinus.

If we want to excel the Greeks,—and I hope we do,—we must at least take the same pains. Dante tells us that "Excellence is not to be got by lying on a bed of down." Thanks to Professor Cockerell, Mr. Penrose, and John Pennethorne, we have the exact sections of some of the Greek mouldings, and they have shown us that when the architect had designed his moulding, he took the trouble of getting the exact conic sections to make his mouldings perfect. Nothing can better show the difference of mental attitude between the Roman and Greek architects than their treatment of their mouldings; the latter felt that no trouble was too great to make their mouldings approach perfection; the Roman architects thought this striving for perfection not worth the trouble, and made their mouldings of segments of circles, determining to cover them with carved ornament if they were too faulty. The English architect is too apt to follow this bad example, or even to do worse; he sometimes boasts of being able to draw mouldings with his eyes shut, or as fast as he can write, or he makes his youngest pupil or his office boy copy them from a book.

I have had one or two Greek, Roman, and Gothic mouldings run, to let you see the difference between them. You will notice, besides the shape, the extremely subtle methods by which the Greeks obtained their effects, and which are utterly wanting in Roman mouldings. The capital and necking of the Greek Doric are perhaps the best-known instances, and are certainly the most appreciated; the deep square abacus looks thick enough to bear the weight of the entablature, contrasts well with the large smooth convex surface of the circular echinus beneath, from which it is divided by the shadow of the re-entering curve, while the abacus makes the curved shadow that contrasts so well with the bright light beneath, gradually deepening into shade; the shade of the echinus is contrasted with the bright lines of the fillets below, intensified by the shadows between them, against which the elliptical flutings die; and a little below this juncture, one thin horizontal line of deep shadow repeats, and enforces those from the fillets above, and contrasts with the delicate shading of the vertical flutes.

In the use of the hawk's-bill moulding the bottom of the cyma, forming the lower part of it, is often brought in just beyond the upright face of the next member, so as to make a delicately-graduated shade finished by a sharp black line; sometimes it is continued by a similar ogee below,—its section is then like a bracket in writing { . Beneath the hawk's-bill there is sometimes a fillet; sometimes this fillet is bevelled outwards; sometimes there are two fillets; sometimes there is a bead beneath; but, whether this bead be bold or delicate, the whole group bears the mark of deep study.

The ogee may be found with a square or with a bevelled fillet under it; sometimes its lower half is sunk in beyond the upright face of the surface below; sometimes it has a bead below it; but you can rarely find two of these mouldings alike. In short, no device was too slight, too eccentric, or too trivial, for a Greek architect to employ, if he thought it would contribute to the desired effect.

In the Doric entablature there is an absence of what *we* call mouldings,—the cymatium belongs to the pediment, and not to the cornice. In the cornice, frieze, and architrave the whole effect is got by flat surfaces, whose soffits are sometimes at right angles, are sometimes bevelled, and sometimes curved. At the Parthenon the only horizontal mouldings in the entablature are a little hawk's-bill moulding, and one sculptured bead; but in all temples the entablature was but a framework for sculpture, in that there was plenty of curved surface; and the Greeks felt the need of severity to set off the sculpture; and they also felt how the curved outline and undulating surfaces of the sculpture set off the formal lines of the architecture.

The Doric temple is undoubtedly the most perfect piece of æsthetic architecture man has yet achieved; every device of architectural composition was lavished upon it. The outside of the building, too, was pure white, enriched by brilliant painting, and adorned with the highest forms of sculpture. Temples, too, were always placed on high ground when it was possible, and expedients were used to prevent the first near view from being directly in the front.

In the entablatures of the Ionic temples we get but little more moulding than in the Doric, and much less variety; for we have no mutules with their caps, guttæ, and bevelled soffits. In both varieties of temple the same aim is apparent, that is, to get a broad band of considerable projection to cast a deep shadow; this band is just softened under the top fillet by a

* A lecture delivered at the Royal Academy on the 25th ult.

little moulding to join it to the corona. In the Ionic the corona is crowned with an ovolo, or an ovolo and bead. The bed mould in the Doric is but the square mutule band; while in the Ionic it is an ogee and bead. The crowning member of the architrave in the Doric is but a wide fillet, while in the Ionic there is an ovolo and bead beneath a narrow fillet, and sometimes the fillet itself is crowned by a small ogee.

In Doric temples, except that of Jupiter Olympius at Agrigentum, there are no bases to the columns; but in the Ionic there are not only beautiful bases of great variety of shape, but these base-mouldings are often carried round the cella of the temples, so that we see their effect on the straight as well as on the round.

In many instances the mouldings of the Ionic entablature and capitals are sculptured. Though this has been of advantage to us in showing the form of the ornament, which has perished in the Doric, where it was only painted, the sculpture breaks up the surface, and makes perfection of form in the mouldings less necessary than when the ornament was painted; but it appears that the Greeks were no less careful in the design of the original shapes of the mouldings, and in perfecting them by conic sections.

We once professed to admire Greek art, and even its most deadly opponents have never denied its perfection. Yet no one ever ventured to publish a full-sized section of a moulding until 1860, when Professor Cockerell gave two or three in his work on Egina, although J. Pennethorne had taken them full-sized in wax, and Mr. Penrose had most elaborately measured them. Yet we have full-sized Gothic mouldings by the score, if not by the hundred, though no sane person could ever compare them, for perfection, with the Greek. Greek mouldings were designed for bright sunshine, and the most brilliant people who ever lived have spared no pains, and no study, to bring them to perfection; besides, in the mouldings of the best buildings we have the accumulated experience of ages, for the Greeks would not sacrifice perfection to novelty.

Before speaking of Roman mouldings, I may mention that, in certain small buildings of peculiar design, the Greeks deviated completely from the proportions they allowed for regular temples; in short, they thought and felt. They did what was structurally and æsthetically necessary for the particular work they had in hand. In the Erechtheum, the entablature is about one-fourth of the height of the column above the base; while in the temple of Pandrosus, the little attached temple with the caryatides, the entablature was about two-fifths of the whole height of the figures. A certain thickness was wanted for the architrave, and a certain æsthetic weight, to compare well with the caryatides, so in this temple they omitted the frieze and made the cornice and architrave nearly equal in depth. To deepen the cornice they put below the ordinary bed-mould a deep dentil band and cap, below that a cavetto and bead, and then repeated the ogee and bead of the bed-mould at the bottom; thus you have a depth of two-thirds of what may be called the original cornice below it.

In the circular monument of Lysikrates, the only specimen we have of Greek Corinthian, the architrave had to be made deep, as it was on the circle; the frieze wanted to be narrow, on æsthetic grounds, to display a proportionate length of sculpture; so the cornice, instead of being one-fifth of the height of the entablature, is nearly the depth of the architrave; to eke out the cornice, a fillet and cyma are added under the bed-mould, then a dentil band and cap, and an ovolo and bead. These heavy cornices, designed for special purposes, commended themselves to the vulgar taste of the Romans, who generally had overpowering cornices, but they had no figure sculpture to consider.

Let me draw your attention to one particular instance of the barbarous taste of the Romans. They knew that the Greeks had sculpture in the metopes of their Doric temples; so in theirs they nailed up the skulls of the slaughtered bullocks with a fillet round the horns. Nature did not make bones to be seen, so they are always ghastly. What are we to think of people who chose bones as an ornament? Nothing can better show the blind reverence the urbane and beauty-loving Italians had for Roman antiquity than their copying this atrocity; nay, I have seen bullocks' skulls on the jambs of an Italian chimney-piece. I have seen them, too, on the front of an English bank, but with more reason, as I suppose they were the monogram or rebus of the architect.

We criticise Roman mouldings under peculiar circumstances; they are the mouldings with which we are most familiar from constantly seeing them on buildings at home and abroad.

These mouldings were spread through Europe by the Italian architects of the Renaissance and their imitators. We cannot even greatly blame these architects, for they came when mankind had just been freed from their ascetic and ecclesiastic chains, mainly through the study of the Roman writers.

The human mind began to feel itself free, and its gratitude was overflowing towards those by whom its fetters had been removed, and through whose means man could roam over new fields of study and delight. The tradition, too, of Rome's power and extent, and of Roman peace, must always have existed, and must have deeply impressed the citizens of the small Italian republics, always troubled by internal feuds, and dreading conquest by more powerful states.

The ruins of Rome's gigantic buildings were almost as impressive as its literature: that was not then known to be a feeble paraphrase of the Greek, and the remains of Greek sculpture that were constantly being found, added to the general respect. Mankind, overwhelmed at once by gratitude, by the traditions of greatness, and by finding in every branch of knowledge works they could not equal, are to be forgiven the enthusiasm they felt. Probably mankind were not then far wrong in thinking that their highest aspiration was to study and emulate the Romans for the time being, in spite of their gratitude being misplaced; but they little thought it would end, as far as learning and architecture are concerned, in binding them with worse fetters than those they were released from. Luckily we have just outlived this mistake of confounding the conduit-pipe with the cool and refreshing water it brings to our lips; and are beginning to doubt if the worship of the brazen wolf of Rome is the highest form of religion.

About Roman mouldings nothing need be said; they may mostly serve as a warning of what to avoid. We may safely say of anything purely Roman connected with the fine arts, that when they are not copies of Greek they are worthless, or worse. In anything connected with constancy and courage, with war and discipline, tactics and strategy; with those arts of diplomacy by which nations may be set by the ears; with those laws by which conquered nations may be kept down, the Roman works may be studied with advantage. The art of planning, by which known wants can be best provided for, and the science of construction, were never carried out better than by the Romans, and we may devote our time usefully to their consideration. Rome, too, was the emporium of the world, and much that would otherwise have been lost was in this way preserved; but the fine arts, that demand a high ideal, noble sentiments, and refined taste, could not possibly flourish amongst them. You might as well expect a man to be a judge of fine claret, who drank a quart of raw spirits every day. The amusement of the Romans was looking on butchery, and they justified it as the proper means of perpetuating their ferocity. At the best they were ferocious peasants, and to the last this was their ideal type; at their worst they were voluptuaries, who had lost every virtue, even their courage.

The Mediævals began a new epoch in architecture, as the Romans had begun a new epoch in construction. On the subject of construction the Romans began to ask themselves what was the use of the lintel, and eventually discarded it. The Mediævals began to ask themselves why they should use mouldings that did not show in their misty climates, and eventually took care that they should show, by deep cuttings and undercuttings.

As the climates in which they worked were so deficient in sunshine, there was too little distinction between the bright streak of light on shafts and their half shade, so they marked it with a projecting fillet, or curved the shaft to an arris.

In both cases the Romans and Mediævals made a great advance,—in fact, a double advance; they began new styles, and they tasted the charm of thinking to a point. This habit of thinking was not exhausted by the solution of the one problem in hand, but remained with each man through life, and was constantly urging him on to make fresh advancement and new discoveries.

Here, at least, one may see an opportunity for the present generation of architects. They may think about their mouldings; they may make them as beautiful as Greek mouldings; and they may learn how to make them as effective in this misty climate as they were in sunny Greece. When once architects begin to think, there is no knowing where they may stop. We might even develope a new style.

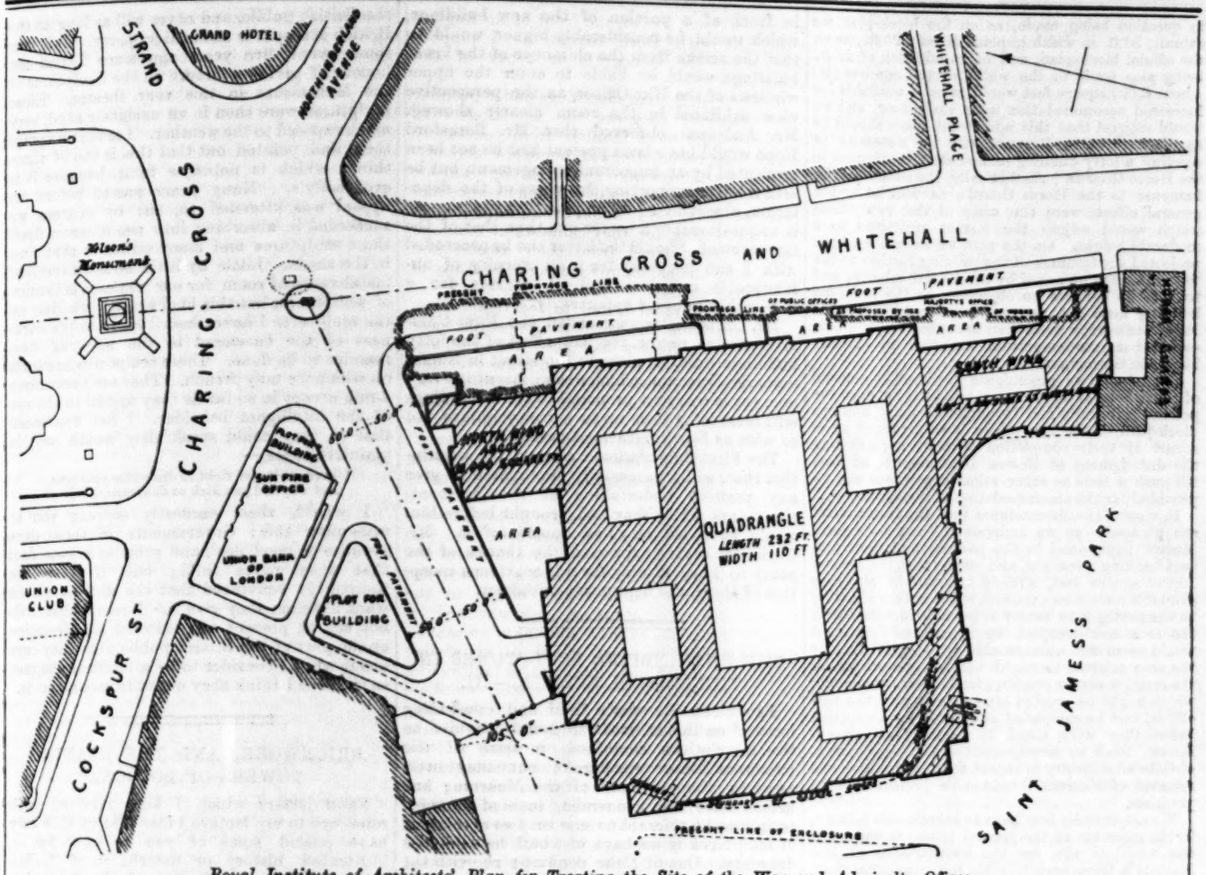
In the present day, we architects are on the horns of a dilemma, for either invention is extinct in the civilised nations of the world, or we are pursuing a wrong method. If it be extinct, we cannot help ourselves, but we cannot be sure of it until we have tried a new method. Instead of saying "the Greeks were the most brilliant people the world has known, and had beautiful mouldings," or that "the Mediævals were the most logical and had effective mouldings, so I cannot do better than follow them," let each one say, "I want my mouldings to be beautiful; I do not want them to be copies of Greek or Mediæval, and I want them to tell their tale in my building. The Greeks had a sunny climate, and marble to work with. I have a misty climate, and stone or brick, how can I make my mouldings look as beautiful as theirs, and show as well as the Gothic mouldings?" Neither of these desires can be gratified at once. We must study the proportions we want, the curvatures of the mouldings, and the way of properly contrasting them; and then, from actual observation on the spot, try to learn by what devices we can make them tell the tale we want. Properly speaking, this is the art of the architect. A man may be a good planner, a good designer, and a good constructor, but he can hardly be an architect until he knows how to get the effects he wants, at the height or in the situation they occur.

Pheidias was a monumental sculptor, and competed for filling the pediment of the Parthenon. Pheidias's model was not chosen, but he demurred to the judge's award, on this ground, that the models were put on the ground while the sculpture was to be placed 50 ft. above it. His objection was allowed, and when all the models were placed at the proper height, his model was adjudged to be the best.

Viollet-le-Duc makes a distinction between mouldings, viz., those which arise from a vague desire of man to ornament his dwellings or monuments, and those which have a definite signification, and are based on thought and logic. He says,—"The ancient Greeks were the first people who knew how to give to their mouldings a form derived from reasoning applied to the object." Two elements have to be considered in mouldings, their utility, and the sentiment their shape will produce. That which marks the mouldings of the five epochs of architecture, is the proper expression of the need they satisfy, and a distinction in their shape which attracts attention, which should engrave them on the memory. This distinction is derived from the sobriety of the means employed, in the choice of their curves, and a keen observation of the effect of light upon them. One may say of mouldings what has been said of style, "mouldings are architecture."*

The Female School of Art. — The Marchioness of Salisbury distributed the annual prizes to the students of the Female School of Art in the Freemasons' Hall, Great Queen-street, on Tuesday afternoon. The Honorary Secretary read the report, in which it was stated that during the past year 196 students received instruction in the various branches of art taught in the school. In 1885, 2,263 works were forwarded to South Kensington for examination and rewards; of these, 957 were in the advanced section, and 1,306 in the elementary. The Marchioness of Salisbury then distributed the prizes. The Queen's Scholarship was awarded to Marion Ryder Henn; the Clothworkers' to Emma Ada Newcomb; the Atkinson to Hilda Lucy Bell; the Duchess of Westminster's to Bertha Jeffreys; the Brightmen to Helen Louise Condor; the Queen's Medal to Mary Harriett Fores; the Baroness Burdett-Coutt's Scholarships to Ruth Harman and Charlotte Maria Alston; and the Gilchrist Scholarship to Catherine Maria Howard.

* In our next we will give the remainder of the lecture, together with a number of sections of mouldings in illustration of



Royal Institute of Architects' Plan for Treating the Site of the War and Admiralty Offices.

THE SITE FOR THE WAR OFFICES.

On Monday morning last a deputation from the Royal Institute of British Architects waited on the First Commissioner of Works, Lord Morley, to present a memorial in regard to the treatment of the site for the new War and Admiralty Offices. The members of the deputation were Mr. Ewan Christian (President of the Institute), Mr. Waterhouse, R.A., and Mr. Worthington (Vice-Presidents), Mr. J. Macvicar Anderson (Hon. Secretary); Sir J. M'Garell Hogg, the Hon. Charles Gore, and Colonel Prendergast (Honorary Associates); Messrs. Chas. Barry, F.S.A., Philip Hardwick, F.S.A., Lewis H. Isaacs, M.P., Banister Fletcher, M.P., David Brandon, F.S.A., Octavius Hansard, E.A. Gruning, G. Aitchison, A.R.A., H. H. Statham, E. C. Robins, F.S.A., and Professor Roger Smith (Fellows); and Mr. W. H. White, Fellow and Secretary.

The deputation was introduced by the Earl of Wemyss, and received by the Earl of Morley, supported by the Hon. Levison Gower, M.P., and Mr. A. B. Mitford, C.B., Secretary to the Office of Works.

Mr. Macvicar Anderson, who spoke for the deputation, pointed out that, as this was a deputation from the Institute of Architects, they had invited only their own members to be present, and that they were not there to open any discussion as to the advisability of the Spring-gardens site in comparison with other possible sites, but only to offer recommendations as to the treatment of that site, which had been selected by the Government. Mr. Anderson then read the memorial of the Institute, as follows:—

"We, the President and Council of the Royal Institute of British Architects, on behalf of the general body of members, beg leave to submit to your Lordship a respectful protest against the proposed treatment of the site in Spring-gardens for the new Admiralty and War Offices, as illustrated by the official block-plan which has been supplied to us through the courtesy of the late First Commissioner, the objections to which we deem to be of so serious a nature as to justify us in pressing upon Her Majesty's Government, before it be too late, some further consideration of the scheme.

Your Lordship may not be aware that in June, 1882, when a Select Committee of the House of Commons was engaged in considering the scheme of the Spring-gardens site, the Council of the Royal Institute of British Architects addressed a letter to the Right Hon. G. J. Shaw-Lefevre, at that time First Commissioner of Her Majesty's Works and Public Buildings, as well as Chairman of the Select Committee of the House of Commons on this special subject, in which they pointed out what appeared to them, judged from a public and an architectural point of view, to be defective and objectionable features in the scheme; and inasmuch as the soundness and accuracy of the views then urged, although not at the time officially admitted, have, in our opinion, received confirmation from subsequent action in furtherance of the scheme, we venture to re-open the question, and to request your Lordship's attention to the following considerations.

The occasion of erecting a great public building on the Spring-gardens site affords the opportunity, —which, if not now taken advantage of, can never recur,—of carrying out two public improvements of the first importance, namely, (1) the widening of Whitehall, and (2) the continuation and opening-up of the Mall to Charing-cross. In no foreign capital, we believe, would such an obvious opportunity be neglected, and we beg leave to record our conviction that no scheme for the treatment of the site should be adopted which does not deal with these two points. That is to say:—

1. The inadequacy of the Whitehall thoroughfare at Charing-cross is patent. The width of the roadway increases considerably to the south, but the northern end is as the neck of the bottle through which the whole traffic from north, west, east, and south has to pass. Manifestly, if only on the score of meeting the requirements of the public, the contemplated removal of buildings on the west side of Whitehall and Charing-cross should be taken advantage of to throw back the frontage, and to allow of a similar width of roadway being continued northwards from the Horse Guards to Charing-cross. Apart, however, from the necessity of thus providing for the exigencies of the traffic, the widening of Whitehall and Charing-cross is essential in view of the erection of a monumental edifice on the western frontage. The unsatisfactory effect of placing lofty structures on the frontages of even wide thoroughfares is strikingly illustrated in Northumberland Avenue, and it is much to be desired that in the present instance a like result should not have to be deplored.

2. The continuation and opening up of The Mall to Charing-cross, with an architectural screen and gates, as at Hyde Park Corner, arranged on a central axis, terminating with the centre of Charles I.'s statue, and affording a vista both of the Strand and of St. James's Park, would be an improvement, the attractions of which are apparent to any one who studies the matter on the spot; so much so, that it is, to say the least, extraordinary that any scheme for the utilisation of Spring-gardens for Government offices should have been considered, far less matured, without embracing it as an essential feature. It would be difficult to refer to any public improvement of equal importance which can be so easily carried out, or to one which would, we feel sure, meet with more general appreciation and approval.

To erect a building of great magnitude on the site in question without sufficiently providing, by the widening of Whitehall and Charing-cross, the space which is absolutely essential to the attainment of a satisfactory result,—a national monument, moreover, the principal frontage of which, according to the official scheme, will remain partially occupied by buildings of an inferior nature, such as shops and a tavern,—is, in our judgment, unworthy of the country. But if the site were treated with imperial consideration such as it deserves,—by removing the few buildings referred to, by sufficiently throwing back the Whitehall and Charing-cross frontage, and by opening up the Mall,—it would at once become worthy of the edifice proposed to be erected upon it.

In anticipation of a possible objection being raised, that the treatment of the site which we advocate would injuriously curtail the space required for the accommodation of the Admiralty and War Departments, we have prepared and beg leave to submit herewith a block-plan embodying our suggestions, which, after allowing for the widening of Whitehall and the opening of the Mall, provides a building area exceeding by about 9,500 square feet the area provided by the official plan. This is exclusive of the additional space, amounting to about 10,000 square feet, which would be available for an extension to the north were Drummond's bank to be removed. We possess no means of forming a judgment as to the sufficiency of this area for the purposes in view, but we conclude that we are justified in assuming that the official scheme provides accommodation sufficient to meet the requirements of the two Departments of State for which it has been devised.

The block-plan we submit is intended to be no more than an adaptation and expansion of the principle of the official plan, our object being not to suggest a plan for internal arrangement, but to show that the principle on which the official plan has been laid down can be adapted to the site, subject to the restrictions which we would impose in respect to Whitehall and the Mall.

Bearing this in view, we venture to point out that the internal courts, as shown on the official block-plan, appear to be inadequate in point of width in relation to the lofty buildings which are to surround them, and we would therefore suggest that a re-distribution of the space allocated to open areas might be advantageously adopted, such as, with a slight increase of space, would admit of the courts

in question being made, as on the block-plan we submit, 50 ft. in width in place of only 25 ft., as on the official block-plan, and of an addition of 15 ft. being also made to the width of the quadrangle. About 6,000 square feet would remain available for increased accommodation upon each floor, and we would suggest that this additional space should be so disposed as to dispense with the necessity of erecting a lofty building immediately contiguous to the Horse Guards. Æsthetically, the gain would be immense to the Horse Guards, as well as to the general effect, were the wing of the new offices which would adjoin the former restricted to a moderate height. On the plan we submit we have projected the frontage of the building further to the west than was proposed by the official scheme, and to this we can see no objection, as the proposed building need not necessarily encroach upon the Park, nor occupy more than the space which is now enclosed as garden-ground attached to existing houses in Spring-gardens.

The scheme we promulgate involves the removal of the whole of the existing buildings between the present Admiralty and Drummond's Bank, and our block-plan of the new offices is so arranged as to admit of their completion without necessitating the dislodgment of Messrs. Drummond's, at least till such a time as other suitable premises can be provided for the accommodation of the latter.

In view of the circumstance that the Government are pledged,—as we understand,—not to disturb Messrs. Drummond in the possession of their present banking premises, and seeing that the area of 10,000 square feet, already referred to as being available for future extension in the nature of a wing to the north, is as nearly as possible identical with the area now occupied by Drummond's Bank, it would seem not unreasonable to suggest whether the area referred to might not be appropriated for the erection of new premises for Messrs. Drummond, which might be erected concurrently with the new offices, and be completed and ready for occupation before they were asked to vacate their present house. Such an arrangement would, we conceive, obviate all difficulty in regard to the acquisition and removal of Messrs. Drummond's present banking premises.

We respectfully beg leave to submit this scheme, in the interests of the general public as well as of the world of art, for the consideration of Her Majesty's Government, with the conviction that, while satisfactorily providing for two great and much-needed public improvements, namely, the widening of Whitehall and the opening-up of The Mall, it will secure a site worthy of the important buildings that are to occupy it, will provide an increased area available for the new offices, and afford the architects who have been already employed a better opportunity than they now possess of producing a national monument, such as may bear comparison with similar structures in foreign capitals.

We have the honour to remain, on behalf of the general body of members of the Royal Institute of British Architects,

Your Lordship's most obedient servants,

EWAN CHRISTIAN, President.
ALFRED WATERHOUSE, } Vice-Presidents.
THOMAS WORTHINGTON, }
J. MACVICAR ANDERSON, Hon. Secretary.
WILLIAM H. WHITE, Secretary.

Royal Institute of British Architects,
9, Conduit-street, Hanover-square, London, W.,
22nd February, 1886."

In the course of some conversation which followed, Lord Morley said he gathered from the memorial that the two points to which the Institute specially directed attention were the opportunity for widening Whitehall at that point (and the advisability of doing so on architectural grounds as well as those of public convenience, in order to enable the new building to be better seen), and for securing an opening from the Mall into Charing-cross. Mr. Charles Barry pointed out that the widening of the small internal courts of the proposed building, from 25 ft. to 50 ft., was considered by the deputation as a most important point on sanitary grounds. Room for doing this, without lessening the accommodation within the building, was obtained by the proposal to extend the limits of the site slightly westward into the Park, which would have little practical effect as an encroachment on the Park, but would add a considerable space to the internal area of the building. In regard to the question of lowering the new building towards the Horse Guards, Mr. Mitford observed that the architects had not been aware originally of the interest which Londoners felt in the Horse Guards building, but that on being made aware of this, they had themselves moved their lofty tower from the position contiguous to the Horse Guards, which it occupied in the first design, to the position which it occupied in the amended design. A member of the deputation pointed out that one effect of leaving Drummond's Bank and other buildings in front of a portion of the new buildings, which would be considerably higher, would be that the smoke from the chimneys of the lower buildings would be liable to enter the upper windows of the War Offices, as the perspective view exhibited in the room clearly showed. Mr. Anderson observed that Mr. Beresford Hope would have been present had he not been prevented by an important engagement, but he sent a letter supporting the views of the deputation, observing:—"The plan that you propose is unquestionably a better one than that of the Government. Should the latter one be proceeded with I can prophesy for it an eternity of unfavourable criticism and of regrets for a thoroughly bungled opportunity."

Mr. Christian recommended the First Commissioner to notice the bad effect of the lofty buildings crowded close to the street in Northumberland-avenue, which was apparent to every one, yet it was now proposed to erect buildings still more lofty close up to a thoroughfare not so wide as Northumberland-avenue.

The First Commissioner assured the deputation that, while necessarily unprepared to give any positive undertaking at the moment, the points which they had brought before him would have his very best consideration. Mr. Christian having expressed the thanks of the party to Lord Morley for his courteous reception of them, the deputation withdrew.

THE UNEXHIBITED SCULPTURES IN THE BRITISH MUSEUM.—III.

PROFESSOR NEWTON'S third and concluding lecture* on this subject was mainly devoted to the inscriptions contained on some of the numerous Roman sepulchral monuments stowed away in the basement of the Museum; but before describing and reading some of these inscriptions he referred to one or two specimens of sculptured sarcophagi, of which he exhibited drawings. One of these drawings represented the end of a sarcophagus found at Cyrene, on the north cost of Africa. He instanced this specimen as being a very suitable model for the decoration, by carving, of articles of furniture, &c. The design consisted of Cupids bearing festoons of flowers. These festoons, he had no doubt, were copies of the actual festoons which were used to deck the Roman tombs. The inscriptions on some of these sepulchral monuments were very curious, most of them relating to endowments left in trust to the survivors of the deceased on condition that they observed certain religious ceremonies at stated times. An interesting portion of the lecture was devoted to a description of the *columbaria*, or "pigeon-holes," which were formed in large numbers by co-operation between all sections of the people as the future resting-places of their ashes, which were enclosed in urns or small marble boxes. The management of these *columbaria* was described, the proprietary being analogous to the members of a modern provident burial club or society. After describing one or two more sculptured sarcophagi, one of which afforded a very interesting representation of the marriage of Cupid and Psyche, with evident attempts to portray the incidents described by Apuleius, the lecturer referred to the light which ancient cut gems were capable of throwing on the study of the myths and sculpture of the ancients, and in conclusion he said:—Now I have said what I had to say about these buried remains. In the vaults of the British Museum are all these things, which have been buried since the year 1852, and which are defaced and begrimed with dirt. They are utterly useless to anybody in their present position, and they cannot be seen without the aid of a lantern. Now, of course, I am bound to accept the decision of my generation, and, if it is the pleasure of the British public to leave these things where they are until the advent of another generation more sympathetic with regard to archæology, I have nothing more to say. As you are aware I have ceased to be in any degree responsible for the present condition of these unhappy monuments, or for the exhibition of any other part of the magnificent collection of which I had the honour to take charge up to a very short time ago. The responsibility has entirely passed from me, but, if I may venture to say so, the responsibility has not passed from the British public, and never will as long as the British Museum is national property. It is now some twenty-five years ago since I had the honour of giving a lecture on the Sculptures of the Mausoleum in this very theatre. Those sculptures were then in an unsightly shed, very much exposed to the weather. I made an appeal then, and pointed out that this is one of those things which is nobody's fault, because it is everybody's. Many years passed before my appeal was attended to, but by degrees we succeeded in absorbing into the Museum itself those sculptures and many others at that time in the sheds. Little by little we have received instalments of room for our national collection of sculptures, but this final act of bringing up the sculptures I have described from the darkness of the basement to the light of day, remains to be done. These sculptures are texts on which we may preach. They are themselves dumb except in so far as they appeal to the eye of the intelligent beholder. I feel convinced that if they could speak they would say, in plaintive tones,—

"Perhaps it was right to dissemble your love,
But why did you kick us downstairs?"

I would, then, earnestly entreat you to remember this: Governments in these days promise a good deal, and promise a good deal that they never fulfil; but if they are thoroughly convinced that the British public want a thing, they give it. I regret that I do not see at present any outward manifestation on the part of the British public that they care about what I consider to be a national disgrace so much as I think they ought to care about it.

* For detailed reports of the first two lectures see *Builder*, pp. 296, 352, *ante*.

BRICKWORK, AND THE LEANING TOWERS OF BOLOGNA*.

FROM letters which I have received with reference to my lecture I fear that its title may have misled some of you to look for an illustrated history or description of Italian brickwork in general, and of the "Leaning Towers of Bologna" in particular. I must, however, ask you to listen to a much more humble and unpretending discourse, which aims merely at putting into intelligible form a few notes which some years ago I made of these towers, as bearing upon the treatment of our own brickwork at the present day.

If I should repeat anything which you already know I hope, at any rate, it may not be altogether without some fresh feature of interest. If lessons are worth learning they are worth being brought forward in various forms and from various points of view.

Finding myself, then, at Bologna one fine September morning in the full enjoyment of a most enviable and acceptable holiday, I strolled away before breakfast towards those celebrated towers, and I thought I could not do better than take a "constitutional" to the top of the higher one and enjoy the view from such an isolated and commanding position at the height of some 300 ft. from the ground. I had, moreover, a desire to acquaint myself with the arrangements and construction of its interior, especially with reference to its staircase, the thickness of its walls, the diminution of its exterior dimensions, the description of bricks used, and the nature of the mortar and of the construction. I had no intention of making any special use of my investigations, but, having taken a few notes, I was urged by a friend to put them into shape, as likely to afford some little interest, if not instruction, to others also.

The Architectural Association immediately arose to my view in the long prospective, and having taken sketches of a few details, carefully to scale, I felt that I might be able the better to come before you. Most unfortunately on reaching Florence I irremediably lost my sketch-book, and together with it my hopes of being able to prepare anything worth producing. Nevertheless, on my return journey, the interval of an hour and a half between my trains afforded me the opportunity of renewing some of my notes of this tower, and taking again some dimensions of its sectional treatment. From the hurried nature of my second visit I am a little doubtful on one or two points, but I shall still venture to give you the leading features of this interesting structure, together with a few practical hints with reference to modern brickwork which its study suggested to me.

* A paper by Mr. William White, F.S.A., read before the Architectural Association on the 26th ult.

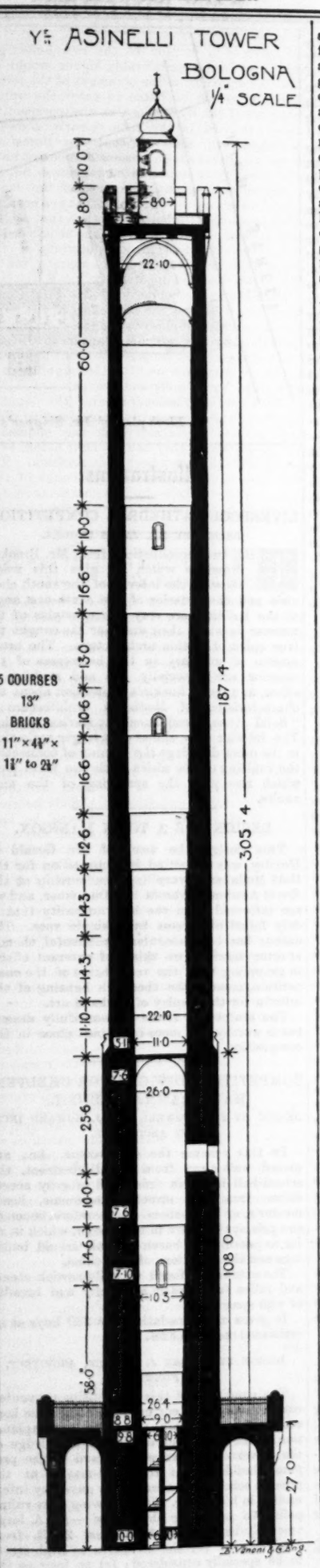
This tower,—the completed one,—was built in the year 1109, by Gherardo Asinelli, from whom it derives its name. The adjoining tower, built by the family of the Garisenda in the following year, probably never was completed. Intended to out-top the other, it is now but half its height, whilst its declination is between 19° and 20°, that of the other being only 13°. There were formerly endless doubts and disputes among tourists and guide-books, and the question is very often still asked at the present day, as to whether the towers were purposely built in this way, or whether they had subsided through defective foundations. Bædeker says the tower of the Garisenda was built thus,—purposely on the slant. But their appearance, no less than contemporary history, seems conclusively to point to their subsidence taking place immediately after, and partly during the course of their erection. This certainly was the case at Pisa. In this campanile the declination is the greatest at the lower part, and thence to about two-thirds of its height it is gradually led back by a gentle curve towards the perpendicular. I say "towards" the perpendicular, for the upper part is still out of the line, so far as the eye can judge.

Signor Filopante, of Bologna, took accurate observations of the tower at Pisa, as well as of those of Bologna, and assured himself that a sufficient subsidence was still taking place to make it probable that they must eventually fall in a certain number of years, if it should still continue as he maintained it did. To my mind the probability is wholly against their falling, inasmuch as they must have fallen long ago had not the ratio of the subsidence been one of diminution rather than of increase, or even of a regular fixed quantity. The greater the divergence from the centre of gravity the more rapid would be the subsidence, other causes being equal, but here the ratio of subsidence seems to be less, at any rate so far as it has gone, and, therefore, it must be diminishing, and unless it had long ago nearly reached its bearings, it is not likely that more than its name would have now come down to posterity. It would not be surprising to hear that the tower of Pisa is still sinking, considering the way in which the water has been allowed to stand, from time to time, from 6 in. to 1 ft. in depth round the base on the lower side, and to soak away into the foundations.

It appears, indeed, like the Chapel of the Spinelli, to have sunk bodily into the earth, for its lowest stage stands now in a deep area sunk around it. In confirmation of the theory that their declination is from subsidence, rather than from intention, is the fact that a considerable part of the Tower of the Garisenda was taken down from fear of its declination becoming dangerous. Gally Knight says that the Asinelli Tower also was reduced in height by 156 ft. after the earthquake in 1416. Then, again, the idea of an intended inclination seems wholly improbable from the mere difficulty there must be in building safely to such a great height, with inclined and diminishing perpends or plumbings, and on an inclined bed, to say nothing of the absurdity of supposing that the men of that day would not start the walling in level beds, even if they really had an intention of building out of the upright, which is an almost equal absurdity, although there may have been then, as now, remarkable men who would set aside common sense to strain after an affectation of originality. The name Asinelli may be interpreted as meaning "little asses." And if the theory of an intended inclination as attributed to them had proved to be the true one, the diminutive ought rather to be changed into the opposite. But this certainly would not be appropriate to the constructors of this interesting and remarkable monument. The experience of the builders of the Asinelli Tower appears to have been lost upon their successors in the following year as to the treatment of the foundation of the Tower of the Garisenda. They altogether failed to complete their work. There it stands, a crude and forlorn monument of honourable rivalry, we will hope, between the two families.

There is but little attempt in these towers at the ornamental treatment of detail in brickwork which characterises so much of the Italian work, and adds so greatly to its beauty and interest. There is, however, in the Asinelli good and careful design and construction about the several parts, giving it an effect of satisfactory harmony and completeness.

We must now proceed to a short description of the building itself. The base of the tower is



about 51 ft. square, but nearly half of this is formed by an enclosing wall carrying a terrace at forty-three steps, or about 27 ft., from the ground, with a parapet hung out some feet over it, upon a deep moulded corbel course. At about 80 ft. above this is a battlemented set-off externally, and a paved floor. The tower then rises some 220 ft., diminishing upwards to the corbel course carrying the parapet, at the paved platform on which the cupola stands. The cupola is a bell-tower. It is about 8 ft. square, and is covered with an ogee roof. It has a large plain semicircular-headed belfry window, on each of its four sides. So much for its general aspect. We must now look a little more closely into the details of its construction.

We enter at the base by a narrow door, the head of which is formed partly by arching and partly by stone lintels, on massive corbels, through a wall 10 ft. thick, into a circular staircase of 6 ft. 10 in. diameter. Very few of the original steps of this staircase remain. There were about fifteen steps in the circuit, giving 17 in. in. width next the wall, with a 12 in. newel and 7½ in. rise. The newel staircase ceases at about the ninety-third step, or in about six circuits. The inside is then set off square, 9 ft. 3 in. each way, with walls reduced internally to 8 ft. 8 in. thick, the walls having been already reduced externally from 10 ft. at the base to 9 ft. 8 in. at the top of the newel staircase. This external reduction is by a set-off at the height of the forty-third step already spoken of. There is a small opening out on to the parapeted terrace. This terrace is carried on a small barrel vaulting and external wall, which does not seem to be otherwise connected with the main structure, to which it forms a surbase, and around which rude sheds were built early in the fifteenth century, in such a way as effectually to disguise the original design. Just below the cessation of the newel staircase comes the first window in the west front, and from its position with relation to the stairs, and to the windows over, in the north front, I concluded that the newel staircase was to have been carried up, but was abandoned. Remains of ten or twelve steps are still visible, broken off at the wall, where the well-hole begins. At about two-fifths of the height there is a plain groined vaulting, and paved floor opposite, the embattled exterior set-off seen in the perspective. At the top of the tower is a vault, with a twofold system of ribs, to carry the paved terrace and cupola over. To this I must recur presently. There must be some error in the height of this cupola as given by Murray at 38 ft. The portion rising behind the parapet cannot be more than 17 ft. or 18 ft., *i.e.*, nearly three times the height of the 6-ft. door, from the terrace up to the spring of the copper-covered ogee roof with which it is capped, and this roof cannot be more than 9 ft. This would make it but 27 ft. at the most, and only 19 ft. above the 8 ft. parapet. Possibly the height may be taken to the top of the finial.

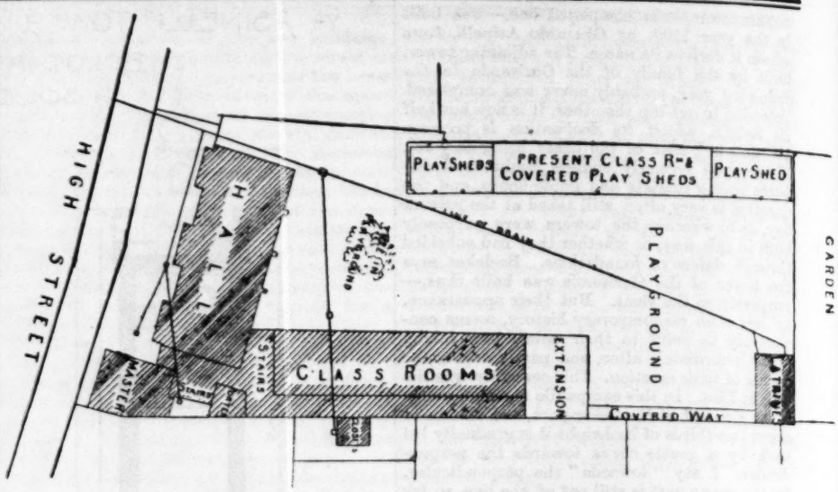
From the landing where the newel ceases, the ascent is now made by a rickety wooden staircase, in short flights against each wall of the square, with insufficient supports; the outer string having sunk some 3 in. below the wall-string all the way up. These steps rise about 7 in. I name this chiefly as affording a check,—very slight, it must be admitted,—to the respective heights of the stages and offsets by which I measured my section. But I cannot give accurately even the number of the steps. There is an old saying that "some people cannot count," and Murray numbers them at 429. This, at all events, cannot be correct. There is, however, a difficulty in counting these steps, there being a number of low quasi-steps, varying from 1¼ in. to 3 in. in height, which one hardly knows whether to count or not. And I had not the opportunity of checking my counting a second time. I lost my dinner as it was, and very nearly my train, which would have been almost as bad. But, in ascending, by adding together the number of steps in the stages, or points at which I made note of them, they come to 452, besides the cupola, which was locked. Whereas in descending I counted them through, to the vaulted stage 271, and to the ground 174, making in all 445, which is probably the more correct number, though still 16 more than given by Murray. Then as to the height in feet authorities differ. Of course, I could not measure this. But Murray gives it at 293 ft., and at 331 ft. to the top of the

lantern. I ought to say that, excepting the cupola, so far as I can calculate approximately by the steps, and also by the distance apart of the putlog holes, my dimensions work out to the same result within a few feet, although with such small units it is very easy to be a long way out. But it is only on this basis that I have been able to go, for the accompanying section. There are, in addition to the stages, but two material offsets on the inside. The manner in which they are made suggests the possibility of intermediate vaulted floors having been contemplated at these points. The others are only from 1 in. to 3 in. and at very irregular intervals from 10 ft. to 15 ft. apart. There are recesses left for large beams at most of them. There is nothing to show whether these were ever provided or not, but they were probably used for stages or landings for the steps or ladders. The heights of the stages of scaffolding outside seem to have been very regular. Above the set-off these were 4 ft. 9 in. apart, and below it 4 ft. 6 in. These holes were not filled up. Indeed in Italy they generally built from the interiors with scaffolding only hung out from the wall, and the holes were still left perhaps to facilitate further repairs. Their appearance is not so objectionable, as one might suppose, and in this case especially. I think they add a favourable feature to the work which would otherwise have nothing to relieve its massive plainness and monotony. It also affords to the eye better means of taking in the real height and scale of the building. The windows are small, being 17 in. wide and 4 ft. 3 in. high to the spring. The interior opening is 2 ft. 4 in. wide. The sills are weathered a little outwards and stepped to throw out the wet.

We come now to the vaulting of the flat roof. There are first two main ribs across laterally one and half brick wide by one brick deep; *i.e.*, 16 in. by 11 in., and over these resting on them are diagonal ribs 11 in. by 11 in., filled in with brick vaulting, and covered with a paving of brick flat. The walls are, as we have seen, 5 ft. 11 in. thick above the battlemented set-off, and at the top they are 3 ft. 2 in., so that they diminish above the extreme set-off to nearly one-half their thickness, and to less than one half of their thickness from above the basement. The 10 ft. wall at bottom is ten bricks thick, and the wall is three bricks at the top,—not of our 9 in. brick, but about 12 in., when laid as they are, with a wide mortar joint. Both quoins and faces are wonderfully true. The bricks are hard and the mortar sound, and though it has endured the beat of the storm for nearly 800 years, it would still put to shame most of the brickwork of the present day. I did not observe any system of bond in the work. So far as I could see, little or no attention seems to have been paid to it. Perhaps some one can enlighten us presently on this point. The irregularity in the size of the bricks would not be conducive of regularity in this respect. They are very irregular in form. But the average size would be 11 in. long and 1¾ in. to 2¼ in. thick. Five courses of bricks, with an equal number of joints, measure 1 ft. 1 in. Thus the mortar beds are ¼ in. thick, and the side joints are frequently much larger. Consequently every brick is wholly surrounded by mortar, which forms a compact mass throughout the structure, contrasting strongly with the fine thin joint with which bricks are lodged together at their edges after the fashionable mode now in use in England. Sooner or later we shall have to come to specifying our mortar joints to be not *less* than half or three quarters of an inch in thickness, instead of not *more* than one quarter. I have, indeed, for a long while specified the side joints to be wide enough to allow of their being fully filled with mortar. It necessitates good mortar and good construction. But of this we will speak further presently.*

Free Lectures at Carpenters' Hall.—The third of the present series of free lectures to artisans, under the auspices of the Carpenters' Company, was delivered on Wednesday evening last. The lecturer was professor Kerr, F.R.I.B.A., who chose as his subject, "A Gossip on the Philosophy of Building Materials," and impressed upon his hearers the great scope there was for the invention of artificial materials to correspond with the artificial purposes of building. A report of the lecture will appear in our next issue.

* The remainder in our next. A report of the discussion will be found on p. 388.



Block plan of Mr. Skipper's design for Cheltenham Grammar School.

Illustrations.

LIVERPOOL CATHEDRAL COMPETITION.

DESIGN BY MR. JAMES BROOKS.

THE two reproductions from Mr. Brooks's drawings which we give this week, showing the interior of the south choir aisle and the exterior of the south-east angle of the building, are very fine examples of the manner in which their designer has caught the true spirit of Gothic architecture. The broad masses of masonry in the buttresses of the exterior are especially fine and striking in effect, and recal Ruskin's expression about the characteristics of Mediæval architecture:—"Solid stone, broad sunshine, starless shade." The interior view shows on a larger scale than in the other drawings the manner of connecting the vaulting of the aisles with the main piers which rise past the springing of the aisle vaults.

DESIGN FOR A TOWN MANSION.

THIS design, the work of Mr. Gerald C. Horsley, was submitted in competition for the Gold Medal and Travelling Studentship at the Royal Academy schools last December, and we are informed upon the best authority that it only failed of success by a single vote. The author has been singularly successful, though at some sacrifice, we think, of external effect, in grappling with the real theme of the competition, namely, the thorough lighting of the interior for the display of works of art.

The sculptured frieze is beautifully drawn, but is worthy of a more important place in the composition.

COMPETITION DESIGNS FOR CHELTENHAM GRAMMAR SCHOOL.

DESIGN BY F. A. POWELL AND J. HOWARD INCE, JOINT ARCHITECTS.

IN this scheme the class-rooms, &c., are placed well away from the High-street, the school-hall being in front and of easy access either from the street, class-rooms, head-master's, or board-room. It, therefore, becomes the principal feature in the design, which is, as far as possible, in harmony with the old buildings and the traditions of the school.

The exterior is faced with Painswick stone, and relies for effect on simplicity and breadth of wall space.

It gives accommodation for 230 boys at an estimated cost of 5,328*l.*

DESIGN BY GEORGE J. SKIPPER, ARCHITECT, NORWICH.

The conditions of this competition prevented competitors from corresponding with the hon. secretary to ascertain, if needed, any explanation on the conditions or further knowledge of the Governors' views with regard to the proposed building, but the head-master at the present school very courteously gave any information in his power. The following were ruling points in preparing the design:—(*a*) A large assembly-hall set back at least 24 ft. from High-street; (*b*) the elevation to High-street to be specially considered; (*c*) so long as the class-rooms, &c., at rear provided the necessary and proper provisions throughout for the various purposes their distribution would be capable of readjustment; (*d*) the caretaker's house quite an unimportant adjunct.

The accompanying plan shows the accommodation on the principal floor, and on the floor beneath are the lavatories, hat and cloak rooms, coal stores, heating apparatus and caretaker's house, which latter is located under the head-master's rooms, &c. On the first floor, over head-master's room, is the Governors' board-room, which is lighted partly by the semi-circular oriel window shown in the perspective view.

The buildings on either side of school shown in the perspective are from a sketch made on the spot, and in the grouping of the building special care was taken not to form a "gap" in the principal street of the town.

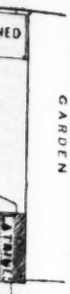
*** We had added an elevation of the accepted design by Mr. H. Hall, but in deference to the wish of Mr. Hall, who thought his design would not be fairly judged by being shown in elevation along with others in perspective, we defer the illustration of it till the completion of the perspective view which Mr. Hall has in preparation.

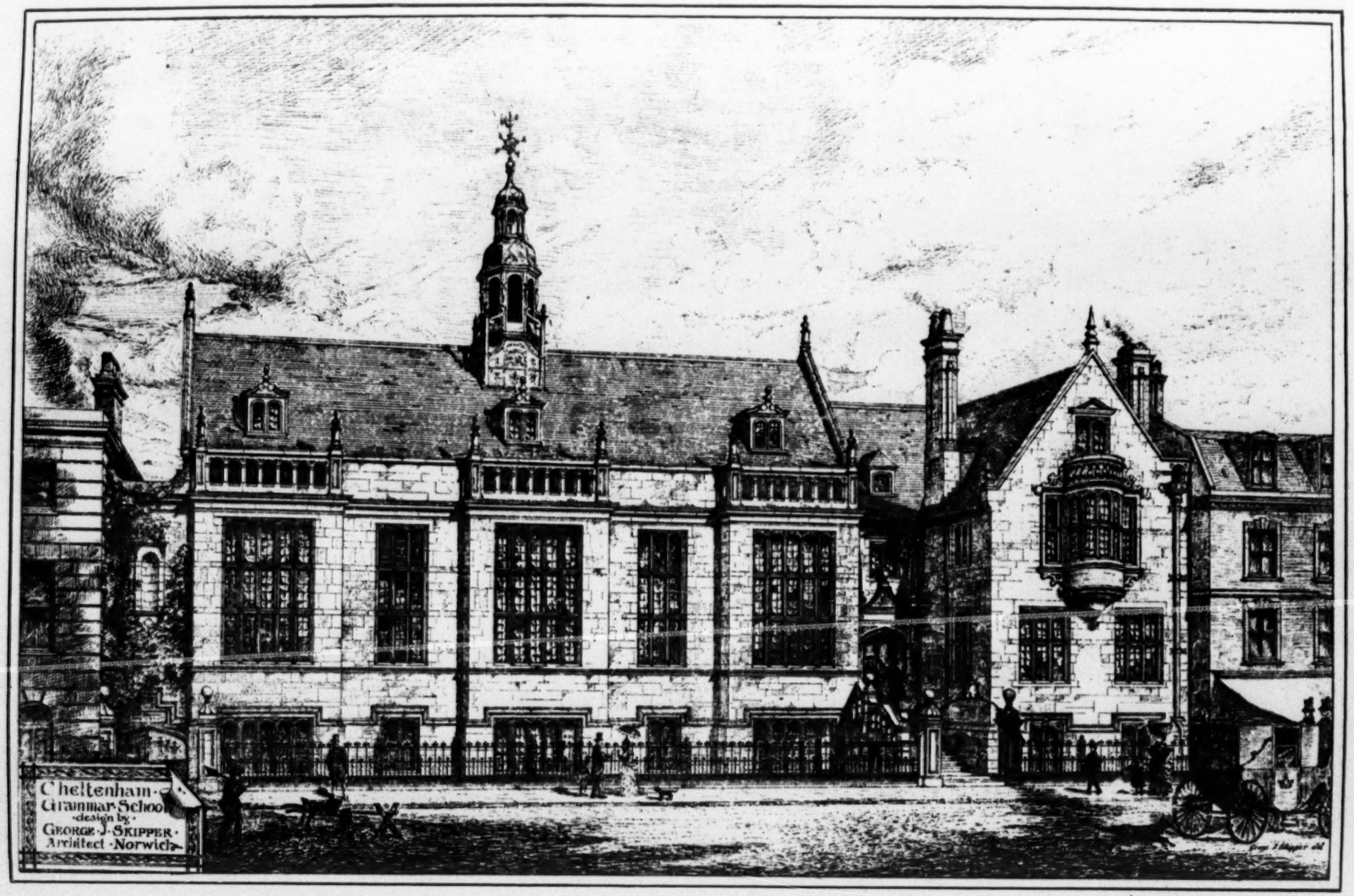
OBITUARY.

The late Mr. E. E. Cronk.—We regret to hear of the death of Mr. E. E. Cronk, surveyor and land agent, of Sevenoaks, which occurred on the 18th ult. Mr. Cronk, who was sixty-four years of age at the time of his death, was a Fellow of the Surveyors' Institution.

Herr Johann von Unruh, the well-known German railway contractor, died recently at Berlin, at the advanced age of 80. The deceased, who was born at Tilsit, studied architecture at the Berlin Academy, and subsequently became a Governmental inspector at Breslau, as well as councillor at Gumbinnen and Potsdam. He was elected director of several important industrial and manufacturing associations, and was the chief builder of the Upper Silesia railroads and the lines running from Potsdam to Wittenberg. He sat as deputy for Madgeburg in the two first Diets of the North German Confederation and in the Reichstag of the German Empire. Herr von Unruh was likewise the author of works on other subjects, amongst them being "Sketches of the Modern History of Prussia" and "Experiences of the Last Three Years," the former of which appeared in 1849, and the latter in 1851.

Fire Protection of the Metropolitan Suburbs.—Owing to the imperative need of increased fire protection for the suburban districts of the metropolis, and the pressure brought to bear by the vestries concerned, the Metropolitan Board of Works, at their meeting on Friday last, decided to order three additional steam fire-engines from Messrs. Shand, Mason, & Co. It is hoped that when the Bill now before Parliament to provide for a higher fire-brigade rate becomes law, an increase will be made in the number of fire-escapes in the outlying districts.

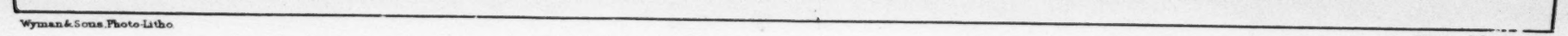

GARDEN



CHELTENHAM GRAMMAR SCHOOL COMPETITION.—Design by Mr. G. J. Skipper, Architect.

Wyman & Sons, Photo-Litho.

C^Queen S^t London, W.C.



Wyman & Sons. Photo-Litho.

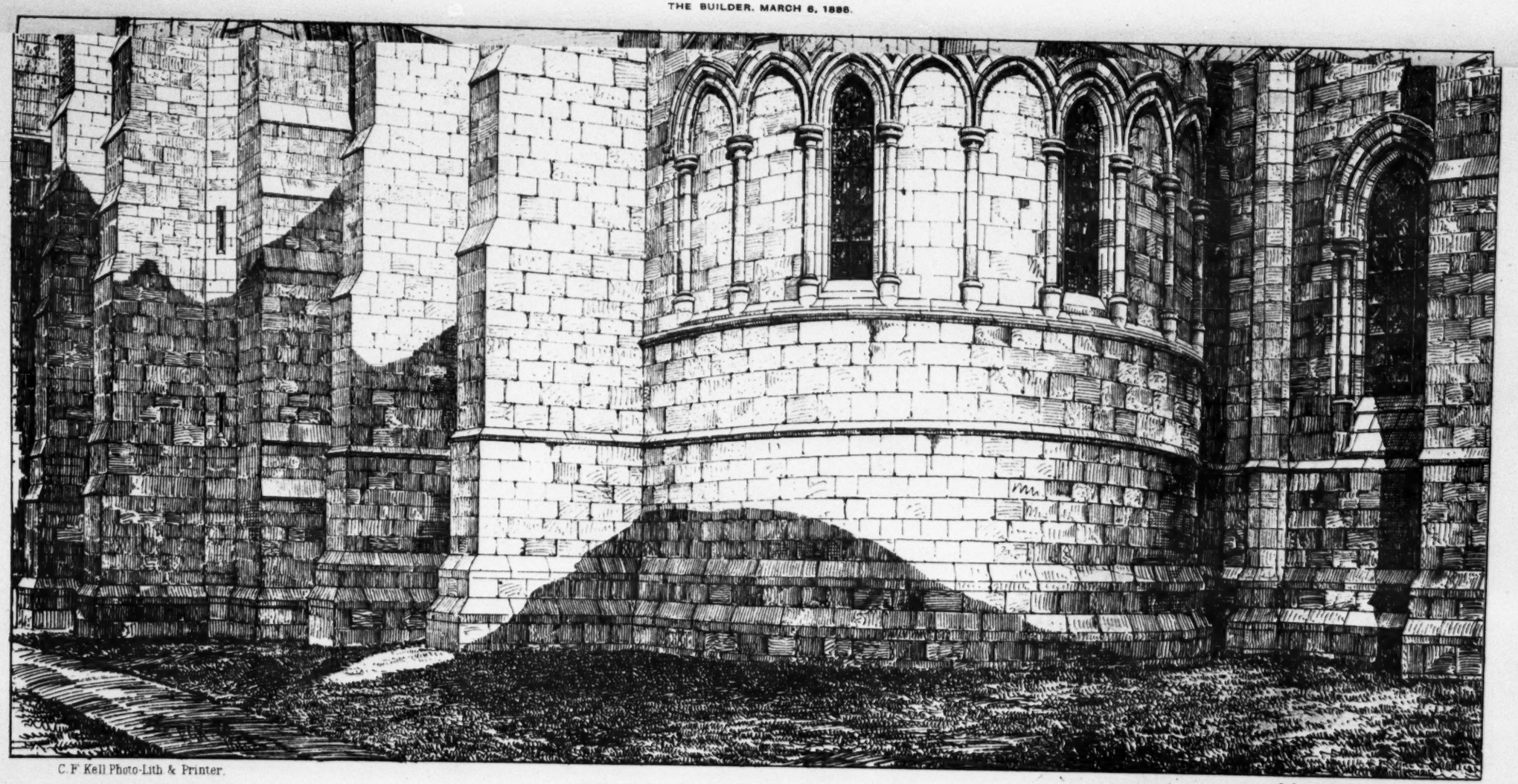
C^Queen S^t London. W.C.

PHOTO-LITHO. SPRAGUE & Cº. LONDON.

LIVERPOOL CATHEDRAL COMPETITION.—Design by Mr. Jas. Brooks, F.R.I.B.A.
View in South Choir Aisle.

Design by Mr. James Brooks, F.R.I.B.A.

The South East Corner with St. John's Chapel.



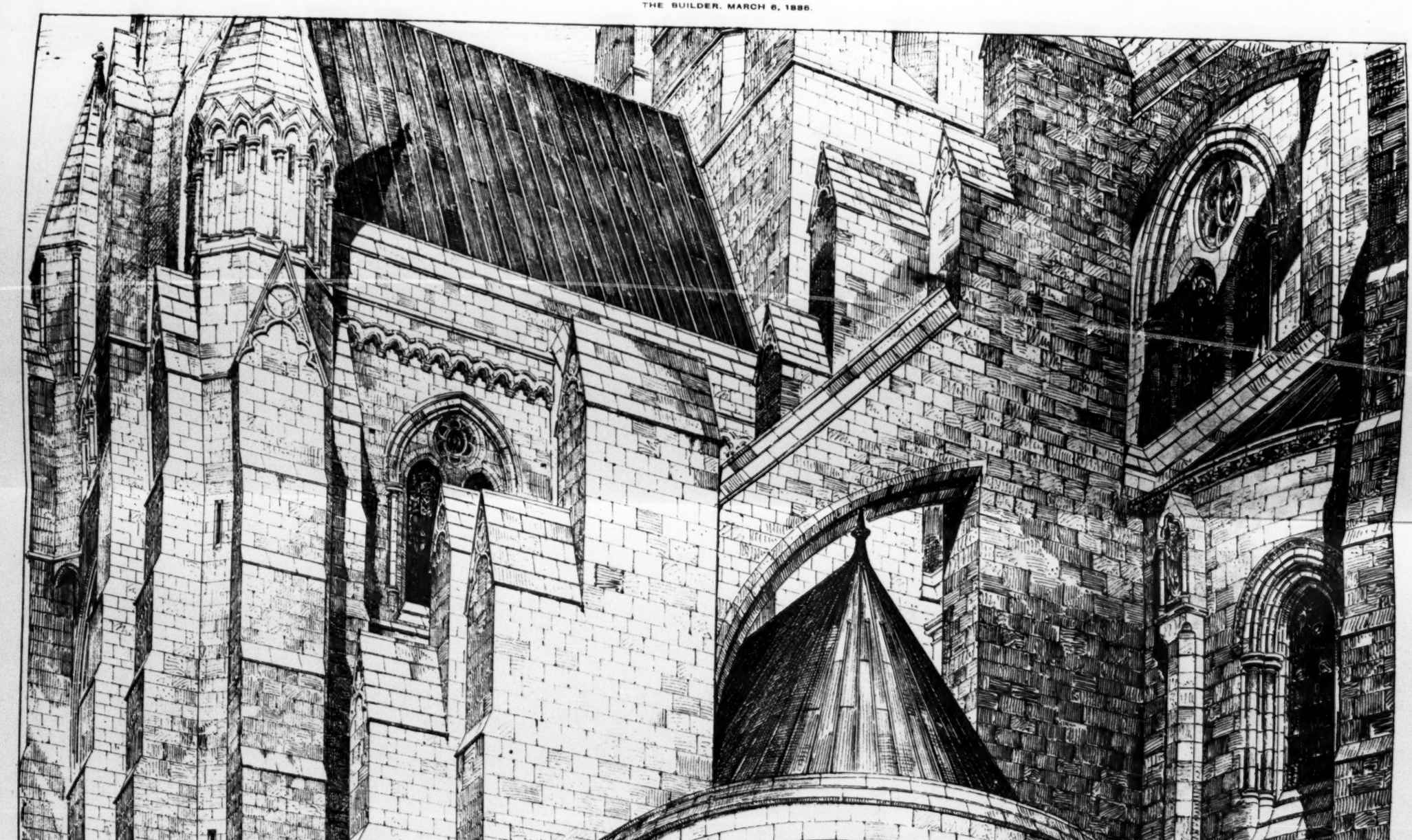
C.F. Kell Photo-Lith & Printer.

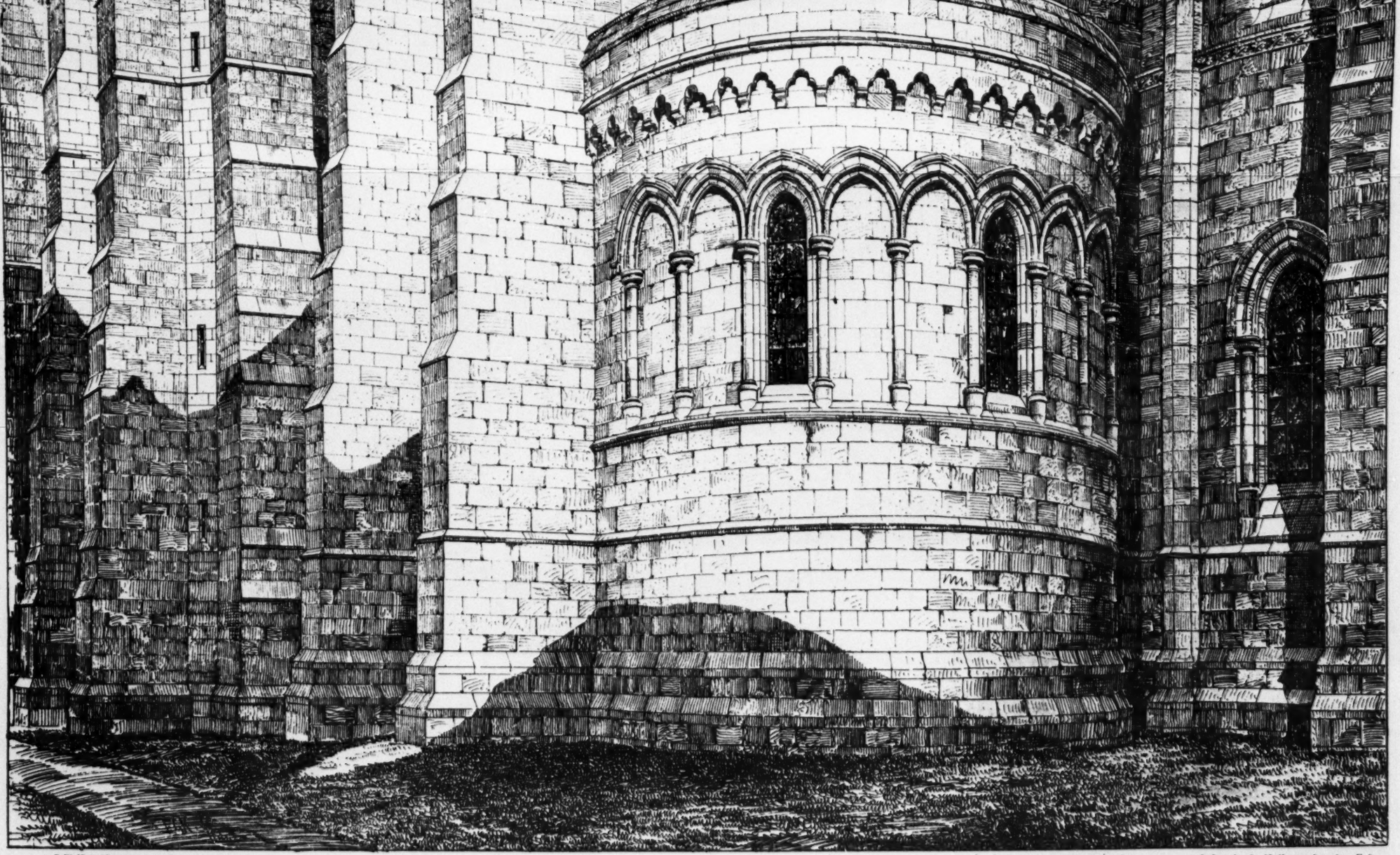
8.Castle St. Holborn. London E.C

LIVERPOOL CATHEDRAL COMPETITION.

DESIGN BY MR. JAMES BROOKS, F.R.I.B.A.

THE SOUTH EAST CORNER WITH ST. JOHN'S CHAPEL.





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8 Castle St Holborn London E.C.

LIVERPOOL CATHEDRAL COMPETITION.

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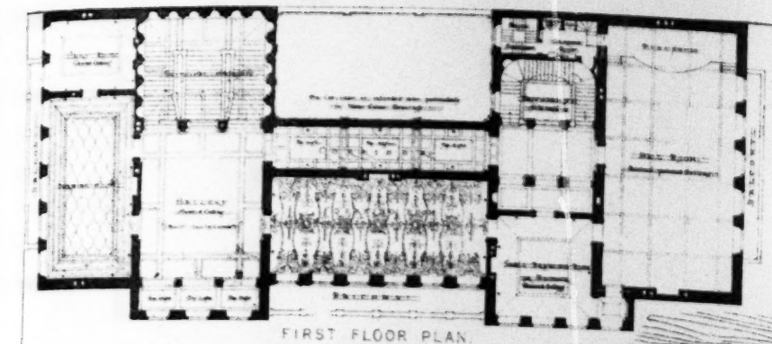
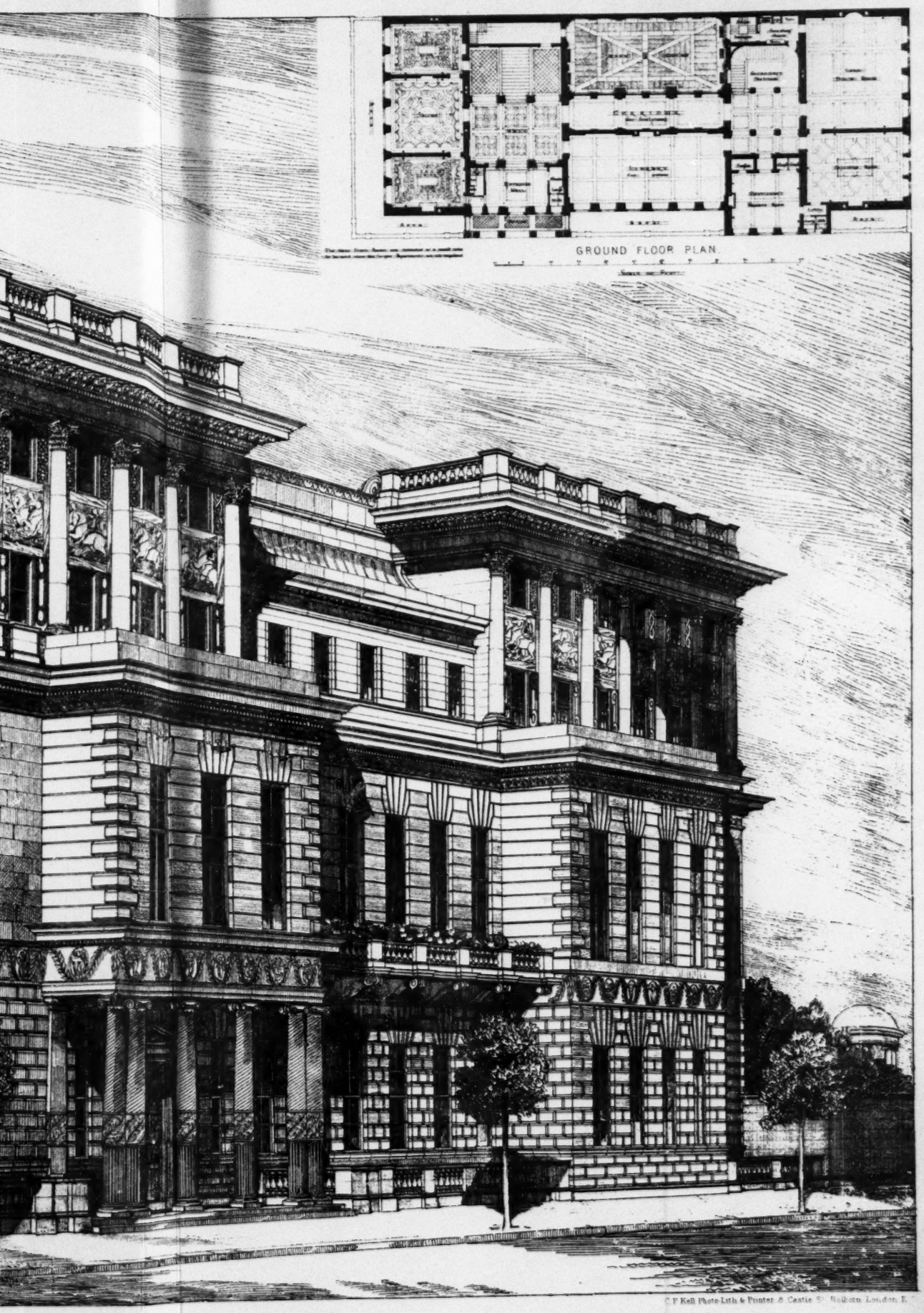


ROYAL ACADEMY GOLD MEDAL COMPETITION. 1885.

DESIGN FOR "A TOWN MANSION,"



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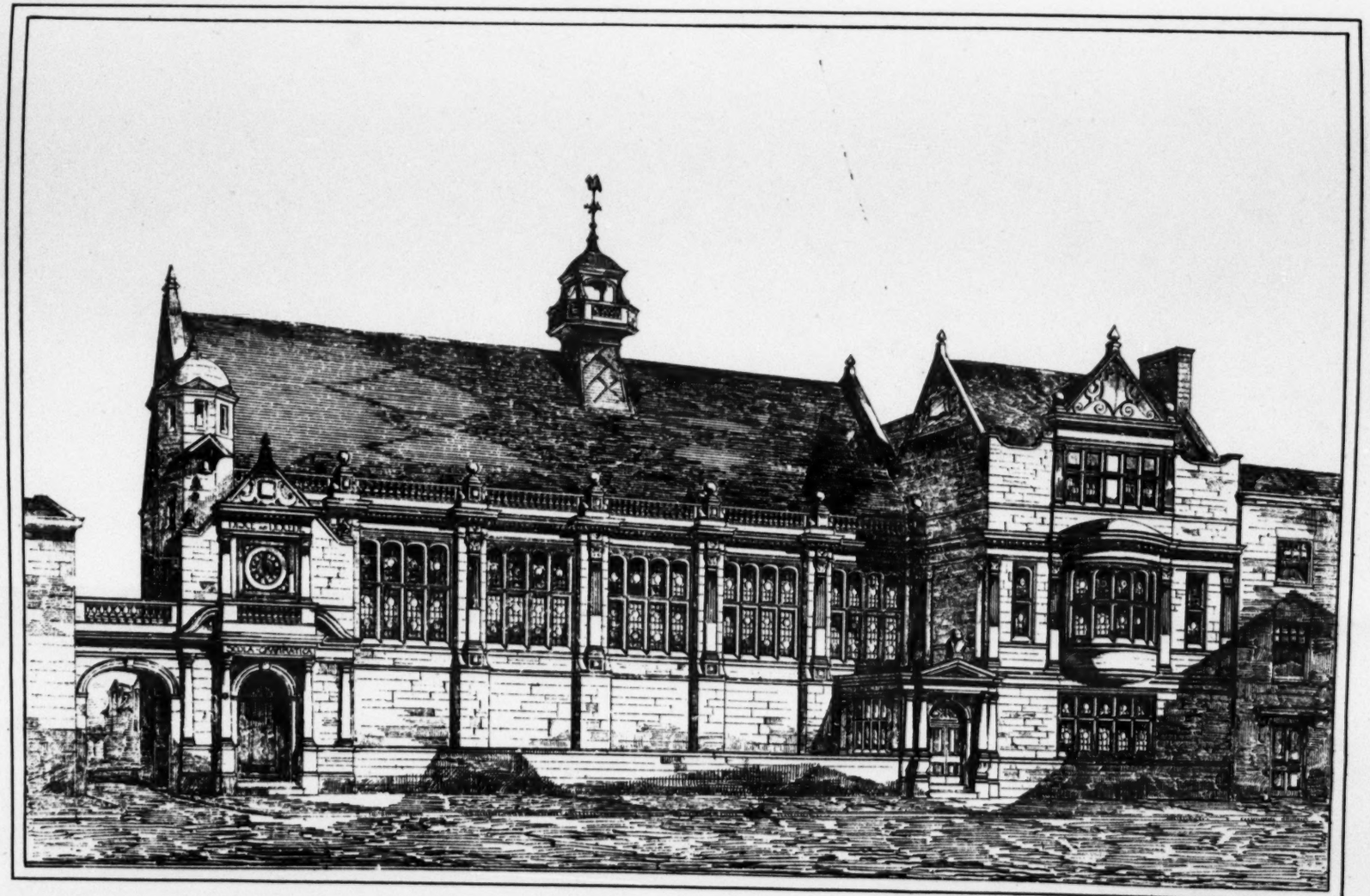
ION," BY MR. GERALD C. HORSLEY.



CHELTENHAM GRAMMAR SCHOOL COMPETITION.—Design by Mr. F. A. Powell and Mr. J. H. Ince, Architects.

Wyman & Sons, Photo-Litho

C. Queen St. London, W.C.

ROYAL INSTITUTE OF BRITISH ARCHITECTS.

MEDALS AND PRIZES, 1886.

AT the meeting of the Royal Institute of British Architects on Monday evening last, consideration was given to the Council's recommendations as to the medals and prizes for the present year.

The Royal Gold Medal.—It was agreed to approve the Council's nomination of M. Charles Garnier, of Paris, as the recipient of this year's Royal Gold Medal.

The Soane Medallion (and, subject to the usual conditions, 50*l.*), for a design for a town church, was awarded to Mr. A. Needham Wilson, —"Le temps mène tout à bien." In the same competition the following awards were made:—Medal of Merit and 10*l.* to Mr. J. H. Curry, "*Ora et Labora*"; a Medal of Merit to Mr. W. H. Bidlake, M.A.; and a Certificate of Honour to Mr. R. W. Schultz.

The Tite Prize of 30*l.*, for a design for a School of Medicine, was awarded to Mr. B. Priestley Shires ("Medicine"). In the same competition a Medal of Merit was awarded to Mr. Alexander N. Paterson ("Doric"); and a Certificate of Honour to Mr. E. R. W. Leeson ("Spes").

The Grissell Gold Medal, for a design for a central octagon to a market, in iron, was awarded to Mr. A. R. Cox ("Student"), the only competitor.

The Institute Silver Medal and 25*l. for Measured Drawings.*—1st, Mr. E. H. Sedding ("Now or Never"),—St. Magnus the Martyr, London Bridge, and Grantham Church, Lincolnshire. Medal of Merit, Mr. Arnold B. Mitchell (The Marney Arms),—Layer Marney Towers, Essex. Another Medal of Merit to Mr. E. L. Conder ("*Ars longa, vita brevis est*"),—Long Melford Church, Suffolk. Certificate of Honour to Mr. S. H. Barnsley ("Vale of Flowers"),—Old Cleeve Abbey.

Institute Silver Medal and 25*l. for an Essay on "Pediments and Gables"* awarded to Mr. Paul Waterhouse ("*Summa sequor fastigia*"). A Medal of Merit to "*More Majorum.*"

Next week we will offer a few observations on some of the drawings submitted in the various competitions.

THE NEW BUILDINGS OF SION COLLEGE AND THE OFFICES OF THE LONDON SCHOOL BOARD.

VISIT OF THE ARCHITECTURAL ASSOCIATION.

THE third Saturday afternoon visit of the Architectural Association was made on the 27th of February to the buildings of Sion College now being erected from the designs of Mr. Blomfield on the Thames Embankment.

The underground railway passing between the building and the edge of the pathway, the projecting porch, which is two stories in height, is carried across it by a bold elliptical brick arch, the filling in of the arch being carried on iron girders which bear on walls on either side of the railway, independent of the railway walls. This porch contains on the ground-floor the entrance lobby and porter's room, and on the first floor a luncheon-room.

The plan of the ground-floor is arranged with one large T-shaped room, which can be divided with screens, which are arranged to slide into a hollow wall, the top over the screen being closed with a revolving-shutter; beyond this room is the council-room. The first floor contains the library, which is a very lofty room, with arcaded walls opening into two aisles, and with a large reading-room over the council-chamber. There are large book-stores in the basement, and several other rooms on the mezzanine floors for dining-room and caretaker's residence.

The work is Perpendicular in style, the tracery and external dressings being of Doulting stone, the facing bricks being red, the columns and corbels to the arches are Portland stone. The staircase is formed of granolithic concrete. The floors are all of fireproof construction, and the woodwork of the library roof has been treated with cyanite to render it fireproof. This is of deal, of hammer-beam construction. It is proposed to panel the walls of the lower hall with the panelling from the old building in London-wall. The ceiling of this room will be formed of oak panelling. The walls above the old panelling will be hung with Lincrusta, the walls of the council-room will be covered with Lincrusta, without any panelling. The walls of the passages and offices are faced with Burmantofts glazed bricks. The heating is by means of hot-water coils placed under the windows in recesses, with gratings opening to the air for the admission of fresh air.

The members passed from Sion College to the new offices of the London School Board. Mr. Bailey, the architect to the Board, kindly attended, and conducted the party over the building. The extension of the premises was carried out from the designs of Mr. Robson. The additions designed by Mr. Robson consist of six committee-rooms and other offices, approached by a new staircase, but in communication with the old building at every floor. The principal committee-room is decorated with a high dado of teak, the upper part of the walls being divided with plaster pilasters, the space between being papered with a dark red paper. The contrast between the teak and the white plaster looks somewhat abrupt, but the general effect of the room is good. The other committee-rooms are panelled, but the woodwork is mostly painted white. The furniture has been designed for each room.

IMPROVEMENTS AT MILAN.

THE enlargement of the city of Milan by the proposed addition of a new suburb between the Piazza d' Armi and the Porta Magenta has been for some time under the consideration of the authorities, and several schemes have been proposed for laying out the ground beyond the Terminus of the Milano-Erba Railway.

The Society of Architects of Milan appointed a sub-committee to consider the various plans suggested, and the report of the committee, together with a plan for the arrangement of the new suburb, and the proposed streets in connexion therewith, is published in the December number of the *Politecnico*, the official journal of the Society. The following are the conclusions arrived at by the committee:—

"The Society is of opinion that the Municipality should purchase from Government the Castle and the Parade Ground (Piazza d' Armi) for the purpose of forming a grand public garden in this locality, crowned by the Arena, the Castle, and the Arch of Peace, surrounded by a fringe of buildings, public and residential, in extension of the contiguous Foro Bonaparte, which buildings should be the subject of special regulations in the interests of art.

That the largest possible space should be assigned to the garden, and that it should be laid out in such a manner as to show the three monuments to the best advantage, it being understood that the Castle shall be respected from an artistic and archæological point of view.

That a new suburb be laid out to the west end of the present parade-ground, in direct communication with the public-gardens, and that the *octroi* barrier be extended to the railway junction (Stazione di Smistamento).

That a communication between the before-mentioned suburbs (*i.e.*, the new suburb and the public garden), one to the east and the other to the west of the railway, with the central part of the city, be formed by means of two streets passing through the midst of each suburb, and converging in a piazza or open space, out of the south side of which two main streets conduct to the Piazza del Duomo, on the site of Via Mercanti and Via degli Orefici, this last street being straightened and widened.

That a grand avenue be formed through the western suburb, and be continued up to the railway station.

That in accordance with the Municipal plan the secondary streets in the western suburb should be arranged visually in line with the arena and the Arch of Peace, with symmetrically-arranged openings into the garden, and terminating in the Piazza Magenta, it being understood that the levels of these streets shall be so contrived as to pass over the North Milan Railway, which should be sufficiently lowered for that purpose."

ARCHITECTURAL SOCIETIES.

Birmingham Architectural Association.—The fifth ordinary meeting of the present session was held at Queen's College on Monday evening last. The Vice-President (Mr. John Cotton) was in the chair. Messrs. T. H. Nowell-Parr and T. W. Baker were elected members of the Association. A paper was read by Mr. J. W. Tonks on "Mayoral Chains and Civic Insignia." The subject was treated historically, and the lecturer pointed out that the knowledge of heraldry and designing in gold and silver was not to be undervalued by the modern architect, —architects in Mediæval times being goldsmiths in addition to their other vocations. At the close of the meeting a series of executed designs for mayoral chains were exhibited. A vote of thanks, proposed by Mr. J. K. James, and supported by Messrs. H. H. McConnal, T. W. F. Newton, J. Cotton, and Victor Scruton (hon. secretary), was unanimously accorded to Mr. Tonks, and after a response from that gentleman the meeting terminated.

Edinburgh Architectural Association.—The members of this Association paid a visit on Saturday last to Fettes College, and were conducted over the buildings by Dr. Rowand Anderson, architect to the Trustees. Dr. Rowand Anderson read a few notes on the founder and the college. The buildings, he said, formed the latest and most extensive buildings devoted to education by private bequest in that city of education; and now that the State was doing so much for education, they would probably be the last of their kind. The founder, Sir William Fettes, died in 1836. The trust funds at his death amounted to 166,000*l.* The funds were allowed to accumulate for some years, and in 1864 the contracts for the erection of the college were entered into, the architect being the late Mr. David Bryce. The college was opened for the reception of boys in 1870, and at intervals since then the various boarding-house and other buildings were erected. The buildings on the ground could accommodate two hundred pupils, fifty being foundationers. The architecture of the building is late French Gothic, as seen at the Royal Château of Blois on the Loire. In treating the interior no attempt had been made to be consistent with the art of the exterior. The drainage of the college, which it appeared is on a very complete system, was also described.

COMPETITIONS.

Cardiff Unitarian Church.—In a limited competition for the above church, which it is proposed to erect in Tredegarville, the designs of Mr. Edward H. Bruton, architect, Cardiff, were unanimously selected. The church will provide for 200 persons, and a Sunday school for about 100 children.

New Chapel and Mortuary, &c., at Armley (Yorks).—On February 1st, forty-three designs were submitted to the Burial Board for a new chapel and mortuary, lodge, and board-room, together with plans for laying out the site as a cemetery. Two premiums were offered of 20*l.* and 10*l.* respectively for the two best sets of plans. On the 27th ult. the Board made selection of the design under motto "Labor et Spes," by Mr. J. P. Pritchett, of Darlington, for the first premium; and "In Perpetuum," by Mr. Thos. Winn, of Leeds, for the second premium. It is expected that the chapel and lodge will cost about 1,600*l.*

The Tilbury Docks Arbitration Case.—The Court of Queen's Bench on Wednesday gave judgment in the matter of the arbitration between Messrs. Kirk & Randall, contractors, and the East and West India Dock Company, in reference to the contract for construction of a tidal basin and dock at Tilbury. Sir R. Webster, Q.C., Mr. Moulton, Q.C., and Mr. Cripps appeared as counsel for the contractors, to show cause against a rule obtained by the Company to revoke the submission to arbitration, or to give directions to the arbitrator, Sir Frederick Bramwell; while Sir Henry James, Q.C., Mr. Pollard, and Mr. K. Digby appeared for the Company, in support of the rule. The contract was entered into in July, 1882, and the works were stopped by the Company in July, 1884. Differences had arisen between the parties, and the arbitration clause of the contract was put in force. The contractors, after some 400,000*l.* had been spent on the works, made a claim for payments in excess of the contract price on the ground that in the deeper part of the excavations they had to deal with mud, instead of clay, indicated by certain borings by the company before the date of the contract. The Company, on the other hand, complained that the contractors did not put in the stipulated quantity of concrete per day, and the contractors replied that this could not be done in the altered circumstances. The Company objected to the reception of certain evidence by the arbitrator as going to an alteration of the contract, which would give the contractors about 150,000*l.* more than the contract price. The Court gave judgment for the contractors, but the learned Judges reserved their reasons.

ARCHITECTURAL ASSOCIATION.

BRICKWORK AND THE TOWERS OF BOLOGNA.

THE tenth ordinary meeting of this Association for the present session was held on the 26th ult. at 9, Conduit-street, Mr. C. R. Pink (President) in the chair.

The following gentlemen were elected members, viz.:—Messrs. D. Geddes, A. H. Goodman, R. P. Sharp, F. E. Faithful, and H. E. Mallet.

It was announced that arrangements had been made with Mr. Weedon, the water-colour artist, for a course of lessons, viz.,—two indoor lessons with copies, and six outdoor lessons on Saturday afternoons, to commence in the beginning of May. Applications to be made to Mr. Hilton Nash.

A vote of thanks was accorded to Messrs. George & Peto for permitting the members to visit the houses now being erected in Collingham-road, South Kensington.

Mr. William White, F.S.A., then read a paper entitled "Brickwork and the Towers of Bologna," of which we print the first portion on another page.

The Chairman, in inviting discussion, said that Mr. White had referred to the irregular shape of bricks, but it would be found that nearly all ancient brickwork was built of such bricks, not only in Italy but also in England. As an excellent example, he would mention the Holy Ghost Chapel at Basingstoke, where the bricks used were of varying widths, and tapered often ½ in. at least in their lengths. There would be found, also, the thick joint which Mr. White had justly recommended. Doubtless many of those present had seen this chapel in passing through Basingstoke, but it would well repay any one who could alight at the station, and spend a short time in its inspection. The detail was of an excellent and remarkable character, reminding one of the French work of the time of Francis I., and was a good type of the development of Renaissance work, although its general lines were Mediæval. In the present day, although of paramount importance, it was almost impossible to get perpends flushed up. Mr. White had referred to the introduction of stucco at the beginning of the century. It was then fashionable to have houses treated in that way, and he thought people were often gulled into believing that stucco was as good as or better than stonework. He knew a stucco house in the South of England on which, it was said, 170,000*l.* had been spent, though even in the present day, he believed, it could have been built with Portland stone dressings, &c., for the money.

Mr. T. H. Watson said that a good many years ago he saw these towers, but at the time they did not suggest to his mind much of what Mr. White had laid before them. Indeed, he passed them by, and went on to see other buildings. Mr. White's paper had, however, interested him very much, and he would like to propose a vote of thanks. He (the speaker) had been somewhat surprised to find that the system adopted by the Romans in the use of brick was something quite different from what he at one time supposed. It was now found that the Roman construction was a concrete one, and where they used brick apparently structurally in arches, the bricks were about 2 ft. long, 1½ in. thick, and 5 in. broad, and were only veneered on the surface. Although one might see an arch running down with a deep soffit, the soffit was a mere veneer with a concrete mass cast in. Why they should have used bricks to such an extent was a matter for curious inquiry. The only solution that occurred to his mind was that the bricks were used to keep the concrete in place until it had set, and was able to support itself. It was evident that the Romans filled up the surface of the walls with bricks, put on much as tiles were now applied, and because it allowed them to carry up their walls in concrete more rapidly.

Mr. John Slater, B.A., remarked that a few years ago he spent a pleasant time at Bologna, the strongest impression left on his mind being the existence there of these two leaning towers, the effect of which from one point of view was most startling. After reading Mr. Street's book on the "Brick and Marble Architecture of Italy," he always felt inclined to keep to the windward of such towers. He was unable to go into the structural question of the towers, but as far as their appearance went, he did not think very much of them. They were, no doubt, very wonderful, but still the amount of labour and expense might have been bestowed with much better effect in some other way. Mr. Watson, he believed, was wrong about the brick facing on the Roman walls. No doubt Roman walls were built of concrete, but many of them were not faced at all. In cases where the brick had been cut away, the remains of the marks of the boards forming the casing were still perfectly visible. Those gentlemen who a couple of years ago went through the tunnel of the District Railway, would remember that they could hardly believe the planks were not in position, the concrete having taken their impress to such an extent. An illustration in Palladio's first edition doubtless showed the manner in which the Romans built these concrete walls; and he believed it was entirely for appearance that these brick facings were given to them. The high position which brickwork occupied in Northern Italy was due to the very fine mortar, and the way in which it had been used. Those who could spend a few days in Bologna would see what could be done with carefully prepared brickwork, and he was never more surprised than when he saw the beautiful effects produced by the rubbed brickwork in the Bolognese palaces and churches. The cornices in some of the houses, too, were cut in the most delicate manner out of brickwork, and the bond was carefully preserved. The effect produced by brick cornices was extremely striking, and although the general *motif* was the same, it was worked out in all sorts of ways. Mr. Slater also touched upon the variety of colours in the brickwork of Northern Italy, and mentioned the cloisters of the Church of San Zenone, at Verona, as one of the most beautiful examples of brickwork. He seconded the vote of thanks.

Mr. Stannus, in supporting the vote of thanks to Mr. White, said that he had a theory as to these towers. In the century in which they were built, each man who had his plot of ground within the walls of a town was anxious to exalt his own tower. There were many feuds; and towns and families were riven by dissensions; it was, therefore, easy to understand each man's desire to have his tower higher than his neighbour's, which permitted him to treat his enemies to the polite attentions of boiling oil or melted lead. This sort of building went on to such an extent in Florence that the Republic passed a law that all towers should be regulated and cut down to a certain height, excepting, of course, that of the Palazzo Pubblico. With respect to the declination of these two towers he believed that the foundations were more compressed between them, and that, the ground outside being free, they had settled outwards.

Mr. H. D. Appleton (hon. sec.) could not agree with Mr. Stannus's last remark. At the mouths of rivers the strata were often depressed by the weight of the *detritus*, and heavy buildings were believed to act in the same way. Would not the strata, then, if pressed down by the weight of the two towers, have caused them rather to lean together?

Mr. Randolph drew attention to the fine brick towers of the Netherlands, which he believed were at one time used for purposes of defence, and also as points of observation to see the arriving and departing ships. He did not agree that these towers were unornamental; they rather showed a breadth of treatment characteristic of the material used. The brickwork of towers like Lubeck was also very extraordinary.

Mr. H. W. Pratt said that his recollection of the tower was its effectiveness. One striking feature was that its outside dimensions were the same at the bottom as at the top. Bædeker considered that the smaller tower was the only one in Italy built with the intention of making it overhang. Brickwork should not be treated as joinery.

Mr. Slater recommended any one interested in the question of brickwork towers to refer to Runge's "Backstein-Architektur des Italiens," in the library of the Institute of Architects.

The vote of thanks was then put, and was cordially received.

Mr. White, in his reply, remarked that the facing by the Romans might have been partly for a little bit of show construction, a little sham in the facing of arches and jambs, so as to make them appear solid and deep, when they were merely filled with concrete. They were doubtless also introduced for the effect of the colour which these little bits of brick would suggest. There was a good deal in what Mr. Stannus had said as to the origin of these towers.

CENTRAL ASSOCIATION OF MASTER BUILDERS OF LONDON.

THE fourteenth annual general meeting of the Central Association of Master Builders of London was held at the Offices, 31, Bedford-street, Strand, on the 24th ultimo, Mr. F. J. Dove in the chair.

The secretary, Mr. E. S. Henshaw, read the balance-sheet as audited, and it was resolved:—

"That the balance-sheet as audited and read be adopted."

The secretary next read the following report:—

"The Committee have to state that during the past year, as anticipated in their previous report, a Bill to amend the Employers' Liability Act, 1880, was introduced in Parliament, against which this Association presented a petition so far as it affected the building trade, but its supporters not being able to obtain a second reading are about to renew their efforts during the present Session. Two Bills have been introduced, one by Messrs. Burt, Broadhurst, and others, having amongst its objects the doing away with the six weeks, or any, notice in case of injury,—the other introduced by Messrs. O'Connor, Commins, and others, having, in addition to the doing away with notice, many very important alterations, one being the definition to be put upon the term workman, which it is proposed shall include, besides the persons included in the definition in the principal Act, seamen and all persons, including omnibus and tramway servants, who have entered into or work under a contract of service made with the employer, either verbal or in writing, and whether the work be performed in the employers' workshops or elsewhere, and whether involving manual labour or not,—and also repealing so much of the eighth section of the Act as defines the expression, 'person who has superintendence entrusted to him' as 'a person whose sole or principal duty is that of superintendence and who is not ordinarily engaged in manual labour.' Your Committee will continue, as heretofore, to watch, and oppose generally, the passing of these objectionable Bills.

Your Committee represented to the Metropolitan Board of Works the inconvenience to builders arising from tenders for their work not being opened in the presence of competitors, and were favoured with a very courteous reply, granting the concession asked for in the case of Fire Brigade Stations, and this, your Committee believe, has since been extended to Police Stations; they, however, regret to say that their representations to the Great Northern Railway Company were not attended with satisfactory results, but they will from time to time put pressure on all public bodies to adopt this system. The Committee, however, desire to point out to the members of the Association the importance of protecting themselves against this objectionable system, and all the support which the Association can judiciously afford will be given whenever a cause of complaint is brought to their notice by members.

The subject of the rejection of the lowest in favour of higher tenders has had the careful consideration of your Committee, and amongst others the case of Mr. Krauss, whose tender for the construction of the Cardiff Corporation Waterworks, although the lowest, having been rejected by that Corporation, was specially considered, and your Committee expressed to Mr. Krauss their willingness to bear half the expense of obtaining the highest Counsel's opinion, if he thought it desirable. He, however (after the decidedly adverse opinion of Mr. Jas. Chitty Hannen and Mr. Maton), decided not to put the Association to the expense. Under these circumstances your Committee have thought it advisable to draw the attention of the Council of the Institute of Builders to the growing practice of non-acceptance of the lowest tender, and have asked them to take such measures in connexion with the Institutes of Architects and Engineers as they may deem advisable to prevent, if possible, a recurrence of such practices in future. They also brought pressure to bear on the Whitechapel Board of Works, which, although not successful in obtaining redress in the particular case brought to their notice by Mr. G. S. Pritchard, was satisfactory, inasmuch as an apologetic letter was received for the action they had taken.

Your Committee, on the requisition of a member, held two meetings to consider the practibility of carrying out clause E of Rule 2 as to the keeping a register of foremen and others; a great diversity of opinion was expressed on the question, and it was thought desirable to abandon the subject for the present.

During the past year the action taken by the Plumbers' Company in granting certificates to qualified plumbers has been under the consideration of the Committee, and the Company were communicated with, but up the present no beneficial results have accrued. The Committee will be glad to have the benefit of your views on the subject as to what course may be thought best to adopt to enable the building trade to carry out similar arrangements, so that they may not be dependent on the Plumbers' Company. The Committee feel that it is a subject beset with great difficulties, and requires much thought and consideration, the movement being, in fact, the commencement of giving certificates of competency to every trade connected with building operations, and they are of opinion that the question is a very proper one for the Institute of Builders to deal with.

The Secretary, by order of the Committee, issued on the 9th January a circular asking for a Guarantee Fund to be raised for the purpose of assisting a member to prosecute an appeal, and as the Committee were advised by Mr. Maton, and through him Mr. Edwyn Jones the Counsel, that the case ought to be appealed against in the interests of the trade generally, it was decided to assist the member.

Having regard to the insufficiency of the accommodation at the offices in King-street, your Committee, after a conference held with the Builders' Accident Insurance, Limited, and the Institute of Builders, determined to relinquish their offices in King-street, and take furnished offices (consisting of a clerks' office, and the joint occupation of the secretary's office, the Board-room, and when necessary the use of the Institute-room for general meetings) of the Builders' Accident Insurance, Limited, at a rental of 70*l.* per annum, including all rates and taxes and office expenses. They need not point out the advantages arising from having carried out an arrangement which will enable all those who are members of the several societies to have easy and convenient access to their respective

offices, which are all handsomely and comfortably furnished.

The Committee think it right again to ask your support for the Builders' Accident Insurance, Limited, a strictly mutual company started, as you are aware, in the interest of the trade, to protect employers against accidents to their workmen. During the past year the company has extended the risks undertaken to cover within certain limits accidents caused to or by employers' workmen, by or to sub-contractors' workmen engaged with them without extra premium, and also to the public for an extra premium of 1s. per 10*l.* expended in wages, as defined in the company's policy."

The Chairman having addressed the meeting upon the several matters referred to in the report, moved that the report as read be adopted.

The motion, having been seconded, was carried unanimously.

The secretary reported that the balloting list had been prepared in accordance with Rules xv. and xvi., and it was resolved:—

"That the Officers and Committee, as printed on the balloting list forwarded to members, be elected for the ensuing year."

Moved by Mr. F. Adamson, and seconded by Mr. G. Williams:—

"That the thanks of this meeting be accorded to Mr. F. J. Dove for his services as President during the period he had been in office."

Carried unanimously.

The newly-elected members having taken office, the President, Mr. George Burt, J.P., took the chair, and introduced several matters of interest to the trade to the notice of the meeting, which having been fully discussed by several members from various points of view, the meeting was concluded by a vote of thanks to the chairman.

LONDON SANITARY PROTECTION ASSOCIATION.

At the fifth annual general meeting of this Association, held last Saturday in their Offices, 1, Adam-street, Adelphi, Mr. E. C. Robins, F.R.I.B.A., one of the vice-presidents, took the chair, in the unavoidable absence of the Duke of Argyll.

Mr. Robins read the report of the Council, which showed that the number of members on December 31st was 1,050,—an increase of 167 upon the number on December 31st, 1884. The report went on to give a long list of country mansions inspected by the engineers during the year, including Wynward Park and Seaham Hall, Durham; Saumarez Hall, Guernsey; Ronsden, Dorset, and many others. Also a list of important buildings in London and neighbourhood, including the London Lock Hospital, St. Thomas's Hospital (part of), Grove Hall Asylum, Bow; Bethnal House Asylum, Bethnal Green; St. Catherine's Training College, Tottenham; Cooper's Hill College, Staines; Eton College, and all the masters' houses there. With regard to this last, the report stated that it had been inspected now for the second time, and that it was a source of gratification to the Council that so important a public body as the Governing Body of Eton College had accepted the principle of periodic sanitary inspection, which the Council considered so necessary. Unfortunately the general character of the houses inspected was as insanitary as ever, only 5 per cent. being found in perfect order, and 9½ per cent. (in addition) in fairly good order.

In moving the adoption of the report the Chairman said he wished to impress upon members, and through them upon intending members, that their system was one of *practical testing*.

Mr. Timothy Holmes, hon. treasurer, read his report showing receipts (including balance brought forward), 2,422*l.*, and expenditure, 1,949*l.*, leaving a balance of 473*l.*, against which there were outstanding claims to the amount of about 200*l.*

Dr. Payne, of St. George's Hospital, in addressing the meeting upon the report, alluded to the death of Prof. Fleeming Jenkin, the founder of this Association, and, it might be said, the inventor of this and all similar associations. He was a good engineer, and all his inventions were not only ingenious and scientific, but they *worked*.

Mr. Loch, of the Charity Organisation Society, in seconding the adoption of the report, said it was hopeless for them to try and persuade the labouring classes of the importance of keeping their houses in a good sanitary state unless the class above them showed the way, by putting *their* houses in such a state and keeping them in it.

The report having been unanimously adopted, the meeting proceeded to the business of electing the Council for 1886, and the result of the ballot was declared to be that all the outgoing Members of Council were unanimously re-elected, with the addition to their number of Sir F. Bramwell, F.R.S., President of the Institution of Civil Engineers. Gen. Lord Chelmsford, who had previously been a member of Council, was elected a Vice-President.

SUNDERLAND MUNICIPAL BUILDINGS COMPETITION.

IN reference to this competition, the Leeds and Yorkshire Architectural Society have addressed the following letter to the Town Clerk of Sunderland:—

"PROPOSED MUNICIPAL BUILDINGS, SUNDERLAND.

Dear Sir,—I desire to acknowledge the receipt of particulars, 'Instructions to Competitors,' which have been laid before a general meeting of practising members of the above Society, when I was instructed to communicate to your Corporation the substance of the resolutions passed by the meeting, as follows:—

1. That the promoters of the competition be asked to state definitely if they will appoint a referee, as many competent architects, failing that provision, will be unable to compete, and, in the event of their deciding to do so, to publish at once the name of the selected assessor.

2. That the attention of the promoters be drawn to the advertisements in the papers, the terms of which require 5*l.* to be deposited with the Corporation by any architect who may apply for the terms of the competition, and who must consequently forfeit that sum in case he decides not to enter the competition.

3. That promoters be asked if their wishes are correctly expressed in the paragraph which states (1) a half per cent. will be deducted from the architect's commission; and (2) that they will themselves undertake the quantities. With regard to the first point, the meeting expressed the opinion that the successful architect will be underpaid by a remuneration of 4½ per cent. for all services to be rendered in carrying into execution a building of public importance, requiring so much study in detail.

4. That, in the opinion of the meeting, four sections are quite unnecessary for the purposes of the competition, a longitudinal and a transverse section often being sufficient, even for contract purposes.

5. That the short period between this and the 10th of April is insufficient to give proper study to the subject, and to prepare the necessary drawings, and that the promoters be asked to extend the time to a later date.

In conclusion, the members of this Society have been successful in obtaining nearly a dozen prizes for town-hall designs, and the above resolutions are the result of long experience of the subject referred to.—I have the honour to remain, your obedient servant,

GEO. BERTRAM BULMER, Hon. Sec.

To Fras. M. Bowey, esq., Town Clerk,
Corporation Offices, Sunderland."

BERNINI'S STAIRCASE AT THE VATICAN.

SIR,—In your note to my first Royal Academy lecture [p. 332] you treat the tapering staircase of the Vatican as a device of Bernini's for getting a greater perspective effect. He, no doubt, availed himself of it: a strong proof, in my opinion, of his genius, for thousands look up it to one who looks down.

Hemmed in as he was between the wall of the Vatican and St. Peter's, with only a truncated triangle to work on, his only alternative was to make a parallel staircase, with a wall thin at one end and thick at the other, wasting material and losing effect.

I used it as an illustration of how a man of genius could make a beauty out of a difficulty.

GEORGE AITCHISON.

NEW BYE-LAWS FOR CONCRETE BUILDINGS IN THE METROPOLIS.

SIR,—Mr. Goodwin's letter in your issue of the 13th ult. [p. 287], is so exhaustive on the conduct of the Metropolitan Board that little is left to say without referring back to letters published in your valuable journal of Nov. 16th, 1867, which some of your older readers will remember; but I think it advisable, with your kind permission, to refresh their memory, and for the instruction of younger men to publish again, simply to show that the Board condemn now what they not only granted, but admitted, that Portland cement concrete is superior in strength to brickwork, &c.

[*Letter from the "Builder," Nov.* 16, 1867.]

"STRENGTH OF CONCRETE WALLS.

Determined to see for myself what had been accomplished with concrete, I visited the concrete houses at Gravesend, and, fortunately for my conviction, I arrived at the time of the examination by the Committee of the Metropolitan Board. I saw a 9-in. concrete wall battered with a 14 lb. sledge hammer. Mr. Vulliamy, the Architect of the Board, said that with about three such blows a hole would have been made through a 14-in. brick wall. I cannot say what number of blows were inflicted, but certainly the blows were struck vigorously, the only perceptible effect being a slight crushing of the stones on the surface of the concrete on the side hammered. Mr. Vulliamy tested the wall on the other side with a straight-edge, and declared that not the slightest effect was produced.

ROBERT WHITELEY,
Builder, Huddersfield."

My motive in asking your kind indulgence is to show by facts that a rubble masonry wall in mortar is quite a different thing from a rubble masonry wall in Portland cement, and I think, after thirty years' practical experience in superintending buildings in concrete or (more properly) Portland cement concrete and boulders of stone in all parts of the United Kingdom, also in Paris, Vienna, and Belgium, that, by this time I ought to be well acquainted with the adhesive qualities and tenacity of Portland cement. If two bricks or two rough bits of stone are joined together with Portland cement, you cannot separate them without breaking the stone or brick. The Board might as well say two deal boards jointed and glued together are not properly bonded or connected together. I have been summoned three times at the Southwark Police Court for not complying with the Building Act, at a great cost, and in every case beat the Board, on which point I think the following recommendations, agreed to by the Board, must be, or ought to have been, conclusive.

[*The "Builder," August* 17*th*, 1873.]

"CONCRETE AND THE METROPOLITAN BOARD OF WORKS.

At the last meeting of the Board it was agreed that with reference to the two cases now before the committee of the erection, by Messrs. Tall & Co., of buildings in East-lane, Bermondsey, and Overhill-road, Dulwich, with walls of Portland cement concrete, without having obtained the licence of the Board for the use of that material, that Messrs. Tall & Co. be not pressed to accept a licence for the buildings erected under their patent, and further recommended that a printed circular be forwarded to the District Surveyors, informing them that the Board considered the buildings under this patent to be within the rules of the Building Act."

In conclusion, may I ask, after the Board agreed to this, where was the necessity of a licence? I was summoned before the magistrate at the Southwark Police-court because the walls were not properly bonded and put together. Mr. Biron, the present magistrate at Lambeth Police-court, was counsel for the Board; and, in examining the District Surveyor for Bermondsey, Mr. Biron asked him if the walls were properly bonded and put together. His answer was, they were all bond. After many years the District Surveyors are of the same opinion; but why should I be exempt all these years from taking a licence more than Mr. Goodwin or other builders? I have never asked for any favour, and did not want any. I have built and superintended buildings of small and large dimensions, and never yet had any accident, and shall continue to construct the walls as I have always done. As to building to the Board from licence or the new by-laws, it is a matter of impossibility to erect a wall of moderate dimensions to remain sound. Mr. Goodwin has, he states, built warehouses and workmen's dwellings to the amount of 100,000*l.*; but the only one he built according to the licence granted is a failure; in fact, he has for years built his walls according to my plan. I think the Board would be better employed in framing by-laws for brickwork, and give the District Surveyors more power over jerry buildings.

I will only add that Portland cement concrete dwellings can be built for the housing of the poor at 25 per cent. cheaper than brickwork, leaving a good profit for the builder. And further, if the Board pass their absurd by-laws to strangle concrete, it is my intention to trouble them to summon me again in a short time. With the assistance of kind friends I intend to bring the question of housing the poor so prominently before the public that there can be but one opinion as to the conduct of the Board, viz., that they are the main obstruction in solving the problem how to house the poor and find employment for the working classes.

Feb. 24, 1886. J. TALL.

The Proposed Tower Bridge.—As will be seen by an advertisement in another column, the Bridge House Estates Committee of the Corporation of London invite tenders for the construction of the lower portions of the abutments and two piers of the proposed bridge across the Thames at the Tower.

NEW PUBLIC OFFICES, WEST HARTLEPOOL.

SIR,—In your issue of last week [p. 351], you give the result of this competition, and I observe by a local journal that the author of the selected plans adopted "F.R.I.B.A." as his motto. Now, I do not believe for one moment that the assessor in this case was influenced one iota by the motto, but, unfortunately, professional assessors are not always engaged, and such a motto may, or may not, influence unprofessional judges; at all events, I feel pretty sure that the use of the initials in question as a motto in competitions will be condemned by the profession generally, and a very large majority of members of the R.I.B.A.; and I hope we may not see them used again for such a purpose.

A FELLOW.

*** We entirely concur with our correspondent.

PLUMBERS' WORK.

SIR,—I shall feel obliged if you will favour me with a short space in your columns with respect to the registered plumber.

If we are qualified as such, I think there is need of a little alteration relating to builders' general foremen. In nine cases out of ten the foreman is a carpenter, who knows little or nothing of the art of plumbing. The plumber has to work under his instructions, often against his own better skill and abilities, or, as an alternative, lose his job, which does not pay us in these times. Now, if the architect or surveyor were to give his instructions to the plumber, I, and many of my fellow-workmen, know that many a job would be carried out cheaper and more satisfactorily to all concerned.

Take an instance: a job is ready for the plumbers, two or three are set on another fortnight, two or three more to different jobs in the building. No one is responsible except the *general foreman*, who is *not* a practical plumber; consequently the work goes wrong. We are all in a muddle, and the plumbing costs a great deal more than it ought to do.

What is the use of our being R.P.'s (*registered plumbers*) if we cannot exercise our abilities in the craft? If builders would think of it, they could not fail to see the bad arrangement, and would try to remedy it to their own interest and to the satisfaction of

A PRACTICAL PLUMBER.

TRURO CATHEDRAL.

SIR,—Would you allow me to make an appeal in your paper for a special fund for the above buildings?

The work we are now doing, comprises the choir and retro-choir, with their aisles; the restored portions of the old St. Mary's Church, the lower stage of the clock tower, the two great transepts. The south porch and the baptistery are already contracted for, but unfortunately (on account of want of funds) the contract does not include the lower portion of the great central tower, which should properly come into this division of the work, to make the whole complete. It was hoped that before we reached this portion, the necessary funds would come in, but our walls are now up ready for the great transept roof; and at the meeting of the committee held last week, it was decided not to attempt the tower, but to carry the roof of the great transept and choir through. This is much to be deplored, as the architectural appearance of the present portion will be entirely spoiled, and the effect intended by the original design lost sight of, and also because the cost of erecting this portion of the tower hereafter will be greatly increased, besides the discomfort and annoyance which must be caused (however carefully the operation is performed) by removing the roof over the heads of the congregation, and erecting the permanent tower.

The Committee cannot appeal for funds for this work, as their hands are tied in the matter by their arrangements with the guarantors of the funds for the present contracts. I have therefore determined to make an appeal on my own responsibility, and entirely without the knowledge of the committee, trusting that surely there must be a sufficient number of persons interested in the work of the first English cathedral commenced since the Reformation to soon furnish the necessary amount when it is known that it is so urgently required.

The amount necessary to finish this portion of the Great Tower up to the level of the ridge of roofs of choir and transepts is 2,874*l.*; and this should be forthcoming at once, or otherwise the works will soon be too far advanced.

I shall be most happy to receive promises and subscriptions towards this; or, if preferred, I should think (though I have no authority for saying so) that they might be forwarded direct to the treasurer, Mr. A. T. NIX., Miners' Bank, Truro, if marked as specially for Great Central Tower.

ROBERT SWAIN,
Clerk of the Works, Cathedral, Truro.

A Pulpit of Caen stone and marble, with Portland steps, has been erected in Lillington Church by Messrs. Jones & Willis.

WOODWORK: BEAUFORT CASTLE, BEAULY, N.B.

SIR,—It may interest Mr. Blashill and others to know that some of his suggestions in a recent lecture [p. 302, *ante*] have been carried out here at the erection of this castle.

When commencing, Lord Lovat (the proprietor) wished to use as much of the home-grown Scotch woods as practicable. Some of the doors are entirely of elm, panels 2 ft. 5 in. wide, both sides raised and fielded, the edge of the fielding moulded, and to form the centre of the panel it was then veneered with elm-root veneer cut ten to the inch; not only the doors, but the jambs of window and door openings have been treated in the same way; the effect is very good. This work has been finished about twelve months, and not any symptoms of shrinkage have yet appeared.

When the trees were cut down they were left in log for some months, then cut into plank, carefully stacked in the open air for three years, then converted into their present shape. Age of trees about 130 years.

The kitchen and servants' hall have open roofs of larch; the boarding (larch), 1½ in. thick, is wrought and V-jointed, is in 3 in. widths, and has been up three years with very little shrinkage. The entrance-hall and corridor have panelled ceilings of larch; the chapel has a plain dado and doors; the main staircase, 31 ft. span, has hammer-beam roof; the gallery, 32 ft. span, has a flat ceiling, showing tie-beams (filled in between with plaster to form panels) with timber brackets at the wall,—size of tie-beam, 35 ft. 14 in. by 14 in., without sap. All these are of larch. Age of trees used, between sixty and seventy years.

As soon as possible after the larch trees were cut down, they were taken at once to the saw-mills, cut to size, and plunged direct into water, for six weeks attended to daily, then taken out and stacked ready for use, and up to the present time there is no perceptible shrinkage.

The floor of the gallery, and the floor, staircase, and dado of the entrance-hall, which have been prepared from Scotch oak, are scarcely so successful.

Lord Lovat wishes me to mention that the whole of this work, and all the carpentering (but not the joinery) has been carried out by the crofters of the estate under my direction. I may safely say the workmanship can scarcely be excelled.

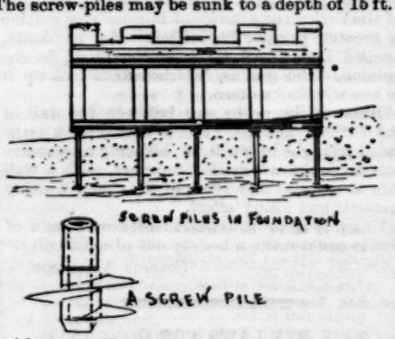
A. CRUICKSHANK, M.C.W.A.,
Clerk of the Works.

The Student's Column.

FOUNDATIONS.—X.

IRON SCREW PILING.

THIS description of piling, which was introduced several years since for use in engineering works, and particularly for getting foundations in sand or loose earth, is capable of being made useful in the foundations of large buildings, but does not seem to have been much employed for that purpose. The screw, which forms the foot of the pile, consists of a blade from 2 ft. 6 in. to 3 ft. in diameter, and when fixed this blade has sufficient resistance to enable it to carry a very great load. Originally these piles were screwed into the ground by the use of long levers of tough wood, working in a capstan-head fixed on the pile itself, and turned by horse power; but it is better to work the levers by means of capstans fixed at a short distance and acting on levers fixed to the pile. The screw-piles may be sunk to a depth of 15 ft.



SCREW PILES IN FOUNDATION

A SCREW PILE

without much difficulty, unless they should meet with large stones, which greatly impede their action. A pile having a diameter of 9 in. or 10 in., with a screw measuring 2 ft. 6 in. across, will carry sixty or seventy tons. There are many cases in which it is not desirable to make extensive excavations in the ground on which a building is to be erected, where the soil would be troublesome or full of water, or where the building projects into a stream. In such cases screw-piles may be used, girders being placed from pile to pile to carry the walls; or iron columns may be fixed on each pile so as to carry the upper parts of the building. Upon the whole, it seems likely that this method of providing foundations in an unsatisfactory soil may be made extensively useful both in diminishing the cost of the groundwork and in saving of time.

In pile foundations, more than in foundations of any other kind, it is important that there should be no settlement beyond what can be amply provided for beforehand. We have seen that in buildings of moderate size, such as the ordinary town houses of the Low Countries, the walls are so completely tied to the internal construction, that settlements may happen almost with impunity. But this will not be satisfactory in buildings of considerable magnitude or of an important architectural character. If through any want of care or judgment one pile fails to reach the solid stratum in which the rest are well fixed, it will yield to the weight, and a very serious fracture in the wall of the building, or in the masonry of a pier will be the result. This mischief cannot very well be repaired; it can only be guarded against by the most careful observation of the effect of the blows of the ram upon each pile, so as to be sure that each has been so driven that it will safely carry its share of the load. The safe load must not be exceeded, and in making the calculation of the weight of the building, it must not be forgotten that, in such buildings as warehouses, which, more than any other, are likely to be built on piles, the loads placed on the floors are limited by nothing but the extent to which it is possible to pack the merchandise which they may be required to contain.

The preparation of foundations, otherwise than by simple piling, in the water of the sea and of rivers, is a subject quite distinct from that of foundations which may be executed by working above the level of the water. It involves the construction of coffer-dams, which are usually piled and puddled enclosures of the space in which the work is to be done, caissons or boxes in which the actual materials of the foundations are placed and sunk to the position which they are intended to occupy, and a great variety of cylinders and other contrivances for executing work exposed to the pressure of water and to the action of floods and tempests. Works of this kind have come to be considered as almost wholly in the province of the engineer, while the great bulk of the foundation works that have been dealt with in these papers are such as fall to the architect. They may, therefore, be properly kept distinct, and studied together with the special classes of superstructure which such foundations are intended to support.

There is no branch of the art of building that has made such beneficial progress during recent times as that of the making of foundations. Indeed, it may be said that in almost every other branch the tendency has been retrogressive. In the period of about half a century, during which an enormous impetus has been given to building, all available ingenuity has been exercised in many quarters to make the other departments of construction as unsatisfactory in regard of workmanship and materials as was possible, physically or legally. But the provision of a fairly good foundation is not only amply sufficient to preserve from failure the structures which are built with the care that was formerly more common than now, it will actually preserve the work of the indifferent builder from the fate that would have undertaken it in days before concrete foundations were known.

The student who has followed this subject carefully with a view to its practical and legitimate application, will not have failed to see how he may benefit by it. It is on the site, and beside the trench, and in the company of those whose life is spent in this work, and in the presence of failures which are the most instructive teachers, that he will find the best illustrations of true principles, and the most effectual corrections of false notions on this important department of his art.

A Cabmen's Shelter.—The thirty-eighth shelter of the "Cabmen's Shelter Fund," the gift of Lady Charlotte Schreiber, placed on the cab-rank at Langham-place, will be formally declared open on Saturday next, the 6th inst., at 3 p.m., by the Right Hon. Sir Henry Layard, G.C.B.

RECENT PATENTS.

ABSTRACTS OF SPECIFICATIONS.

3,847, Sanitary Trap. J. S. Truss.

The body of the trap is box-like and provided with a cover and an outlet-pipe at the bottom. The inlet-pipe enters at the side and turns upward inside the box, terminating in a valve-seat, on which a spindle-valve closes, the spindle being guided in a fitting in the cover. The trap is cast in one piece with the inlet and outlet pipes. The form of the core is also described in the specification.

8,175, Flooring Cramp. A. Dobbing.

The cramping-slide is pushed forward by an eccentric lever; a catch, which falls into notches, runs along the fore top end of the slide. Two holding catches support the slide also.

13,161, Fireproof Partitions. J. Rogers.

For temporarily closing the openings in fireproof partitions, hollow fireclay blocks with sunk handholes, plain or corrugated, are employed. These blocks are carried and stacked in such positions as required, as, for instance, between double iron doors. They may have holes to permit the escape of enclosed air on subjection to heat.

13,380, Drying Bricks, &c. Barclay, Allison, and Barclay.

The bricks are burned by gas which passes from one kiln to another, and thence by flues to a shed used for drying bricks before burning. The gases pass from a gas-chamber into a regenerator alongside the kilns, which are arranged in a parallel series, thence to a chamber at the bottom of the kiln into which they are discharged in horizontal sheets through suitable apertures. The products of combustion pass out at the bottom to a flue leading to the top of a second kiln, and so on being led to a drying-chamber before finally passing to the stack. Each kiln is connected to the gas-chamber and to the adjoining kilns, there being suitable valves and dampers so that the kiln or set of kilns may be shut off from the gas supply, while air may be passed through to cool the contents. The drying-chambers may also be heated by gas brought directly from the producers.

14,514, Raising and Lowering Builders' Materials, &c. W. Heatley and G. Hutchins.

A rope passes over a large grooved pulley at the upper part of the building, and under a smaller pulley below. The large pulley is on a shaft carried in bearings on suitable standards, and rotated manually by a worm-and-worm wheel. The worm shaft is provided with a ratchet to prevent running back, and the worm is provided at the ends with plates, in which are rollers to reduce the end friction. The small pulley at the bottom can be easily fixed in any position. In use, the articles to be raised are taken up by the rope at any point, the attachment being made by clutch pieces. These clutch pieces have inclined eyes, which grip the rope between their opposite edges, when a weight is hung on the hook.

15,160, Flooring or Staging for Greenhouses. B. Treeton.

Perforated slabs, with V or circular grooves, are arranged side by side, and communicating with one another. They receive the water from the plants, and are provided at intervals with drain plugs.

16,918, Handles, Knockers, &c. J. Gordon.

Door-handles, knockers, &c., are made of cast or stamped metal, in two concave parts, with internal projections. The edges are placed together, and molten metal is poured inside, to connect them, and form a solid handle.

NEW APPLICATIONS FOR PATENTS.

Feb. 19.—2,419, J. Hicken, Fixing Door and other Handles to Spindles.—2,427, W. Sanderson, Door Lock and Latch Furniture.

Feb. 20.—2,482, W. Crow and W. Coley, Compound for Coating Wood, Stone, and other Materials.—2,483, T. Gray, Door Lock Handles.—2,489, G. Openshaw, Fastening Rain-water and other Pipes.—2,491, J. Simpson, Gullies.—2,497, R. Cole, Self-acting Cock or Tap.—2,499, W. Howie and R. Henderson, Window Frames and Sashes.—2,500, C. Kinnell and Another, Opening Casements, Sashes, Ventilators, &c.—2,512, A. Boult, Fastenings for Doors, Gates, &c.—2,518, A. Pocock and H. McColley, Metal Floorings or Horizontal Partitions for Buildings, &c.

Feb. 22.—2,530, W. Welch, Hydraulic Cements.—2,531, W. Egglestone, Water-closets.—2,543, E. Birch, Machine for Cutting or Punching Tiles, Slates, &c.—2,547, J. Sample and W. Ward, Securing Knobs or Handles to Spindles.—2,551, A. Roberts, Portable Dust-bins.—2,553, B. Hawes Kemp, Automatic Feeding Apparatus for Sewing Machines.—2,569, A. Flint, Indicating the Condition of House-drains.

Feb. 23.—2,601, S. Pardoe and F. Biggs, Sash Fastener.—2,639, J. Ritzdorff, Imitation of Inlaid Wood.

Feb. 24.—2,659, C. Spackman, Portland Cement.—2,662, W. Shearer, sen., and Others, Brick Pressing and Moulding Machine.—2,671, C. Swindell and W. Clifford, Ventilating Caps.—2,687, W. Sanderson, Cupboard and Door Catches.—2,696, J. Williams, Double Argand Shop-window Lamp.—2,701, W. Stanley, Chandeliers and Pendants.—2,707, E. Hurley, Mounting Gutters or Troughs for Buildings.—2,708.—J. Woodard, Grip for Sash-lines.

Feb. 25.—2,736, A. Jones, Pressing Hip and Valley Tiles.—2,742, H. Coleclough, Rendering Taps Proof against Frost.—2,755, J. & A. Duckett, Water-closets and Urinals.—2,758, J. Bale, Automatic Ventilation of Buildings.

PROVISIONAL SPECIFICATIONS ACCEPTED.

15,820, E. Pither, Door Shield or Finger Plate.—54, W. Hilder, Lowering and Raising Sliding Window Sashes.—440, S. Jenner, Chimney or Ventilating Shaft Top.—561, J. Stanley, Smoke-consuming Fireplaces.—794, A. Thomas, Automatic Flushing-tank.—829, J. Stidder, Flushing Water-closet Pans.—1,496, T. Crampton, Electric Bells.—1,534, A. Clark, Combination Locks.—142, J. Brown, Transverse Ventilation of Sewers.—502, J. Jex Long, Open Fire Grates.—560, J. Wragg, Fastener for Window Shutters and Doors.—858, W. Fowler, Cisterns for Water-closets, &c.—883, S. Phillips and S. Wise, Indicator Lock.—923, H. Buchan, Water-closets.—990, J. Green and Others, Kitchen Ranges.—1,015, G. Wilkinson, Bakers' Ovens.—1,325, R. Hunter and W. Moffatt, Cooking Ranges.

COMPLETE SPECIFICATIONS ACCEPTED.

Open to opposition for two months.

4,873, W. Leggott, Window and Door-Fastening Bars.—5,213, T. Fawcett and J. Fawcett, Pressing Bricks, Brickettes, and Tiles.—5,384, J. Evans, Union Joints or Couplings for Pipes.—10,158, W. Duffy, Wood Block Flooring.—12,525, W. Scrymgour, Construction of Floorings, Roofs, &c.—13,769, H. Meinecke, Water Meters.—1,039, C. Veit, Door Locks.—4,164, W. Stobbs and E. White, Preventing Down-draught in Chimneys.—4,521, H. Yull, Waste Water Preventer.—5,027, J. Smith, Stench Traps.—5,636, S. Coombs, Door Check.—5,684, T. Helliwell, Glazing.—5,956, W. Lester, Astragals for Roofs, Windows, &c.—1,138, A. Bergmann, Locks.—1,184, A. Boult, Water Meters.

RECENT SALES OF PROPERTY.

ESTATE EXCHANGE REPORT.

FEB. 19.

By BRANCH & LEETE and WALKER & RUNTZ.

Liverpool, Walton—The Liverpool Zoological Gardens, freehold area, 9a. 3r. 3p. £19,500

FEB. 22.

By REYNOLDS & EASON.

Borough, Fenning-street—Ground-rent, 110*l.* a year, reversion in 73 years 2,525
Blackfriars—50, Stamford-street, freehold 1,830
66½, 67, 67A, and 68, Hatfield-street, freehold 3,540

FEB. 23.

By DEBENHAM, TEWSON, & CO.

City, Bevis Marks—Ground-rent of 75*l.* a year, reversion in 77 years 1,920
19, Bevis Marks, freehold 1,960

By B. BROWN.

Leyton—Eight houses in Pearcroft-road, 98 years, ground-rent 35*l.* 14*s.* 1,230
Leytonstone—3 and 4, Alvin-terrace, 93 years, ground-rent 6*l.* 220

By HAMNET & CO.

Poplar—42 to 56, even, High-street, freehold 3,150

By FURBER, PRICE, & FURBER.

Poplar—22, Crisp-street, freehold 200
14 to 26 even, Bygrove-street, 38 years, ground-rent 40*l.* 460
Hatton Garden—No. 23, freehold 2,850
Carshalton—Ground-rent of 10*l.* a year, reversion in 78 years 200
South Belgravia—53, Claverton-street, 47 years, ground-rent 10*l.* 650
Warwick-square—7 and 9, Warwick-gardens, 52 years, ground-rent 16*l.* 1,865

By DRIVER & CO.

Vauxhall Bridge-road—Nos. 258 to 270 even, freehold 7,940
Eaton-square—40, Lower Belgrave-street, 33 years, ground-rent 7*l.* 8*s.* 3,000
Harlington—1 to 8, Harlington-row, freehold 430
Cranford—A block of copyhold property 790

By DOLMAN & PEARCE.

Haverstock Hill—1 and 3, Queen's-crescent, 74 years, ground-rent 16*l.* 1,010

By CHINNOCK, GALSWORTHY, & CO.

Bermondsey—Ground-rents of 333*l.* 15*s.*, reversion in about 52 to 59 years 8,630

FEB. 24.

By DALE & SON.

Hammersmith—48 to 56, even, Chancellor's-road; and 13 to 19, St. James's-street, 48 years, ground-rent 69*l.* 2,600
Mile End—123 and 125, Skidmore-street, 31 years, ground-rent 7*l.* 475
71, Harford-street, 23 years, ground-rent 2*l.* 10*s.* 200
Kentish Town—100, Harmood-street, 19 years, ground-rent 4*l.* 10*s.* 150

By F. J. BISLEY.

Deptford—75, High-street, freehold 1,000
Rotherhithe—10, 12, and 14, Faustin-place, freehold 250
38, Albion-street, freehold 405
5 to 8, Canute-street, 64 years, ground-rent 9*l.* 410

FEB. 25.

By FAREBROTHER, ELLIS, CLARK, & CO.

Stratford—Freehold ground-rent, 50*l.*, reversion in 26 years 1,020
North Kensington—83, Cambridge-gardens, 77 years, ground-rent 8*l.* 1,070
Edgware-road—6 and 8, Praed-street, freehold 2,400
Pentonville-road—No. 252, term 18 years, ground-rent 53*l.* 10*s.* 430

By F. ELLEN & SON.

Andover, near to—Freehold cottage, and 3a. 2r. 38p. £360
A plot of freehold land 100
Binley, near St. Mary Bourne—Freehold residence, and 5a. 2r. 30p. 500

By C. C. & T. MOORE.

Dalston—81 and 83, Middleton-road, 36 years, ground-rent 10*l.* 320
31, Fassett-square, 68 years, ground-rent 5*l.* 380
Stepney—45, Perth-street, 7½ years, ground-rent 6*l.* 35
Mile End—3, St. Peter's-street, 44 years, ground-rent 3*l.* 3*s.* 240

By E. STIMSON.

Camberwell—52 and 54, Harold-street, 81 years, ground-rent 10*l.* 410
Southwark—3 to 6, Hayles-terrace, and a ground-rent of 5*l.* a year, term 27 years, ground-rent 25*l.* 770
Peckham—28, 30, and 32, Costa-street, 79 years, ground-rent 12*l.* 490
47 and 49 Peckham-rye, 40 years, ground-rent 12*l.* 580
Kingsland-road—10 to 13, Wellington-street, 12 years, ground-rent 52*l.* 10*s.* 100
16, 17, and 18, Wellington-street, 12 years, ground-rent 39*l.* 65
19 to 27, Wellington-street, 12 years, ground-rent 117*l.* 215
Hackney-road—91 and 92, Scawfell-street, 3 years, ground-rent 8*l.* 68
95 and 97, Scawfell-street, 3½ years, ground-rent 7*l.* 93

By HERRING, SON, & DAW.

Brixton—68, Wiltshire-road, 76 years, ground-rent 1*l.* 950

FEB. 26.

By Messrs. CRONK.

Sevenoaks—The residence called "Heathfield," and 1¼ acre, 82 years, ground-rent 40*l.* 3,010

By R. REID.

Bayswater, Monmouth-road—The St. Stephen's Mansions, freehold 10,500
Piccadilly—The lease of No. 216, term 12½ years ... 1,350

By HARDS & JENKINSON.

Camden-road—10 and 11, Cantelowes-road, 64 years, ground-rent 14*l.* 980
Nine Elms—20 to 36 even, Ponton-road; and 18 to 28 even, Currie-street, 61 years, ground-rent 47*l.* 1,800

By BAKER & SONS.

Kensington, Baron's Court Estate—Three plots of freehold land, 7a. 0r. 25p. 20,800

MEETINGS.

SATURDAY, MARCH 6.

Royal Institution.—The Rev. C. Taylor, D.D., on "The History of Geometry." II. 3 p.m.

Association of Public Sanitary Inspectors.—Mr. W. Warner on "The Disposal of Sewage Sludge." 6·30 p.m.

MONDAY, MARCH 8.

Royal Academy of Arts.—Lectures in Architecture: Mr. W. Watkiss Lloyd will give "An Exposition of the Theory of Proportion in Architecture as understood and applied in detail by the Architect of the Parthenon." 8 p.m.

Surveyors' Institution.—Adjourned Discussion on Mr. Woodward's Paper on "London Remodelled." 8 p.m.

Society of Arts (Cantor Lectures).—Mr. Boverton Redwood on "Petroleum and its Products." I. 8 p.m.

Inventors' Institute.—8 p.m.

Leeds and Yorkshire Architectural Society.—Paper by Mr. G. Aitchison, A.R.A.

Society of Antiquaries of Scotland (Edinburgh).—Five papers. 3 p.m.

TUESDAY, MARCH 9.

Institution of Civil Engineers.—Mr. Dugald Clerk, F.C.S., "On the Explosion of Homogeneous Gaseous Mixtures." 8 p.m.

WEDNESDAY, MARCH 10.

Architects' Benevolent Society.—Annual General Meeting. 5 p.m.

Civil and Mechanical Engineers' Society.—Mr. George Simonds on "The Erection of Colossal Statues." 7 p.m.

Carpenters' Hall, London Wall.—Mr. T. Chatfeild Clarke, F.R.I.B.A., on "The Architecture of City Buildings." 8 p.m.

Society of Arts.—Mr. E. Brice-Edwards on "The Experiments with Lighthouse Illuminants at the South Foreland." 8 p.m.

Liverpool Engineering Society.—Mr. A. G. Lyster, M.Inst.C.E., on "The Manchester Ship Canal." 8 p.m.

THURSDAY, MARCH 11.

Society of Antiquaries.—Mr. T. F. Kirby on "Excavations at Winchester Cathedral Church"; and the Rev. H. M. Scarth "On a Sculptured Roman Stone recently found at Bath." 8·30 p.m.

Society of Telegraph-Engineers and Electricians.—(1) Prof. W. E. Ayrton, F.R.S., on "Economy in Electrical Conductors"; (2) Prof. John Perry, F.R.S., on "Magnetic Resistance." 8 p.m.

FRIDAY, MARCH 12.

Architectural Association.—Mr. S. Flint Clarkson on "Architectural Photographs by J. L. Robinson and other Amateurs." 7.30 p.m.

Royal Institution.—Dr. Reginald Stuart Poole on "The Discovery of the Biblical Cities of Egypt." 9 p.m.

SATURDAY, MARCH 13.

Architectural Association.—Visit to Houses now being erected in Kensington Court. Members to assemble at 3 p.m.

Miscellanea.

Architects' Benevolent Society.—The annual general meeting of the subscribers and donors of this Society will be held, at the above address, on Wednesday next, the 10th of March, at five o'clock.

Steam Laundries.—Messrs. Scrivener & Co. have received instructions to proceed with the erection of the boundary walls of the second laundry of the London and Provincial Steam Laundry Company. The site is close to the Queen's Park Station, Kilburn. The buildings will be very extensive, and are to be commenced at once. The architect is Mr. Ernest Turner.

The Liverpool "Gordon" Working Lads' Institute.—The foundation-stone of this building, which will occupy a site a little to the north of the Stanley Hospital, has been laid by Mrs. Cliff. The building is being erected at the expense of Mr. William Cliff, in memory of his eldest son. The object of the institution is to provide a continuance of the Board School teaching of industrial training in the interest of boys who, having left school, are apprenticed to different trades and are in receipt of daily wages. Besides the educational advantages to be derived from it, social pleasures, gymnastic and other exercises, to elevate and train the mind and body will be provided. The institution will be conducted upon lines similar to the Whitechapel (London) Working Lads' Institute and other similar institutions. The principal entrance is from Stanley-road, and leads into a spacious vestibule, from which the main corridor leads, on the right to the social-room, 44 ft. by 20 ft., with kitchen opening therefrom, and a committee and secretary's room, and on the left to four large class-rooms for industrial and technical training, fitted with stoves, forges, benches, &c. From the main staircase or central hall access is gained to the gymnasium, 60 ft. by 13 ft., and a corridor leads therefrom to the bath-rooms, lavatories, &c., the heating of the building, as also for the baths, being arranged upon the basement-floor. The first floor contains a large lecture-hall and concert-hall, 79 ft. by 42 ft., and 31 ft. in height, with a polygonally-formed panelled roof. Chair accommodation is provided in this hall for 800 persons, exclusive of the orchestra, which will accommodate eighty more. The hall has also been arranged with a view to division into class-rooms, with light movable screens. The exterior elevations of the building, which is Flemish Renaissance in style, are broken with side and central bays, with stepped gables, parapets, and piers, the windows having tympana filled in with interlacing tracery, confined within variously shaped arches. The building will be constructed of red brick and terra cotta, interspersed with red sandstone dressings, the slates being Westmoreland greens. The entire works are being executed by Messrs. Morrison & Sons, of Wavertree, at a cost of about 5,000*l.*, from designs by Mr. Walker, Dale-street.

The National Liberal Land Company (Limited).—The report and balance-sheet for the year 1885, to be presented to the sixth annual general meeting of the shareholders, at the Charing-cross Hotel, London, to-day (Friday, March 5), states that notwithstanding the continued severe difficulties experienced by all sellers of land in finding purchasers, the directors have been able, during the year, to realise from sales the sum of 40,487*l.* 11s. 6d. The purchases comprise a seaside estate at Rhyl, North Wales, and a valuable and important property at Highbury, a considerable portion of which latter has been re-sold at a handsome profit. The profit and loss account shows an available balance of 2,657*l.* 9s. 8d., and the directors recommend that, in addition to the interim dividend already paid for the half-year ending the 30th of June last, at the rate of 5 per cent. per annum, free of income-tax, a divided at the same rate for the remaining half-year be declared and paid, and that the balance, subject to payment of directors' fees, be carried forward.

Guildford.—A memorial window has been placed in the west end of Christ Church, Waterden-road, presented by the late Mr. Pagan, of Oak Lodge, and commemorative of his wife and two children. It is in stained glass, and it illustrates the 11th chapter of Isaiah. The figure of Jesse is placed at the bottom of three centre compartments, and from it start the root and stem referred to. The outer lights contain figures of angels. The genealogy of Christ is shown by the figures of David, Solomon, and others mentioned in the first chapter of St. Matthew, culminating in the figure of St. Mary and our Lord (the Incarnation), and His subsequent death. In the two pieces of tracery are figures of SS. Joseph and Joachim. The general treatment is after the style which prevailed in the latter part of the fourteenth century. The window has been designed and produced by Messrs. Lavers & Westlake, of London.

Erratum.—By an obvious misprint in our last issue, Mr. Bignell's Church, at Walthamstow, was described as having cost 800*l.* It should have been 8,000*l.*

Society of Engineers.—At a meeting of the Society of Engineers, held on Monday evening last in the Town-hall, Caxton-street, Westminster, Mr. Perry F. Nursey, President, in the chair, a paper was read on "The Roorkee Hydraulic Experiments," by Mr. E. S. Bellasis, A.M. Inst. C.E. The paper was an examination and criticism of an extensive series of experiments on the flow of water in the Ganges Canal, made by Captain (now Major) Allan Cunningham, R.E., in the years 1874—79. The author, after stating that there were many important questions connected with the experiments to which attention had not yet been directed, proceeded to consider the method of velocity measurement. He enumerated the faults which the double float possesses, explained how it should be designed so as to minimise them, and argued that with the patterns of float used at Roorkee the amount of error must in many cases have been large, and that much better results would have been obtained by using floats of a different pattern, and probably better still by using current meters. Double floats were unsuited to very rapid streams, but the idea that they were not suited to deep streams was shown to be erroneous. The rods used for measuring the mean velocity between the surface and the bed did not reach to the bed, and, therefore, would give results slightly in excess of the true mean velocities. He contended that rods and floats were not generally so good as current-meters. Referring to the distribution of the velocities in the cross-section of the stream, the author, after showing that the depression of the maximum velocity below the surface could not be due to the resistance of the air, adduced further evidence in support of the law discovered by the experimenter, that the ratios of the different velocities to one another are independent of the mean velocity in the stream. Another law propounded by the experimenter, namely, that the form of the transverse curve of velocities is independent of the depth of water, held good only in a rectangular channel.

Sounding by Potassium.—A very ingenious scheme for detecting the presence of sub-soil water has lately been devised by an American engineer, and is described by our Transatlantic contemporary the American *Engineering News*. In connexion with some large public works at Boston it was desirable to test the effect that certain pumping operations would have on underground water. A number of small pipes were, therefore, driven into the ground into which the water would rise. The problem was to gauge the height of the water in the pipes in a simple and effective manner. A spring steel tape had attached to its extremity by a wire hook a small leaden weight. In the top of this there was a hole in which a cork was forced, and in the cork was fixed, in a vertical position, a needle, the point being upwards. The distances were so arranged that the point of the needle would be just on a level with the zero mark on the tape when the whole was allowed to hang in a vertical position. A small piece of metallic potassium was placed on the point of the needle, which would then be lowered by means of the tape into the pipe. Directly the potassium came in contact with the water it would ignite with a slight explosion, at which time the depth the tape had descended would be noted, thus giving the height the water had reached.

The Metals Exhibition at Rome.—The principal attraction just now at Rome is the Metals Exhibition, which is being held at the Palazzo di Belle Arti, situated in the Via Nazionale. Amongst the most important exhibits are two bronze statues, discovered in the Italian capital in the course of last year's explorations, one of these being the bronze Bacchus which was recovered from the bed of the river Tiber in September last. There is also an ancient lantern on view, brought from Venice, where it had been preserved. A magnificent pedestal, dating from the fifteenth century, with three steps supporting a column, is placed in a prominent position, and attracts much attention. The pedestal is encircled with carved leaves, chiselled in the metal, whilst a bird, representing an eagle with its wings spread out, is perched upon the extremity of the column, clasping a book. A figure, which is intended to represent Emanuel Philibert of Savoy, is standing in the centre of the hall. It is attired in armour, consisting of polished steel inlaid with gold. The above are only a few of the many interesting works which this exhibition contains.

Royal School of Mines.—Professor Warington Smyth, F.R.S., in continuing his lectures upon mining, in the theatre of the Geological Museum, Jermyn-street, considered the various systems adopted in the working of building stone. The pillar and bord or gallery is the most common, and dates from a very early period. It may be seen in the quarries of Egypt and Hindostan. The pillars there are rectangular, and sometimes, if the ground is not very firm, the openings are arched. The catacombs of Paris and Rome, and the caverns of Maestricht, have been wrought on a system not unlike this. Another remarkable instance, to be seen in our own country, is that of the quarries at Box, near Bath. In this case, the stone being strong, the angle of dip moderate, almost flat, and the character of the rock such as renders it capable of being cut with a saw, there is a degree of regularity such as is scarcely to be seen in any other workings. The headings or galleries are 25 ft. wide, and are crossed by others, leaving 12 ft. pillars between; the height of the stratum varies from 8 ft. to 20 ft. in the district. A very long-handled pick is used in these quarries, for the holing, and the rock is then cut away with a saw, the pillars being left permanently for support.

The Porosity of Building Materials.—Professor Recknagel has lately called the attention of German architects to the subject of the movement of the air in dwelling-houses, and to the fact, well known among English sanitarians, that air passes through the walls and ceilings. He asserts that the air presses upwards through the flooring with the same force as that with which it passes through the lowest part of the vertical partition of a room; while it penetrates the ceiling with the same force as that with which it passes through the upper portion of the upright wall. Statistics of Berlin mortality show that there is a higher death-rate amongst the persons living in the lowest and highest stories of houses than amongst the inhabitants of the intermediate floors; the dwellers in the loftiest rooms breathing air which has already passed through the lungs of those in the other portions of the house. During the colder seasons this is particularly the case. Professor Recknagel attributes, moreover, to the nature of the filling between the floors a certain share of the blame for the exceptional mortality of 28·2 per 1,000, which prevails in Berlin amongst the inhabitants of the stories higher than the fourth. As in summer a contrary movement takes place, it is remarked that the residents on the first floor then breathe air which has passed through the lungs of the occupants of the garrets. In view of the evidently injurious consequences of dry-rot in the beams which separate one floor from another, it is urged by Herr Wagner, of Mayence, in the *Deutsche Bauzeitung*, that massive work in iron and stone, with a filling of slag-concrete, is the most suitable alternative mode of construction, the difference in expense not being out of proportion to the sanitary and other advantages thereby obtained.

The "Tale of Troy" and "Orestes."—The "Tale of Troy," as performed three years ago at Cromwell House, will be reproduced (in the English version) on the evening of May 27th, at the Prince's Hall, Piccadilly. The "Story of Orestes," an abridged translation of the Orestean Trilogy of Æschylus, which has been written by Professor Warr as a sequel to the former, will be represented on the preceding evening, May 26th, and also on the afternoon of May 28th, in the same place. The tableaux and scenery have been designed by Sir Frederick Leighton, bart., P.R.A., and Messrs. E. J. Poynter, R.A., G. F. Watts, R.A., and Walter Crane, and the music specially composed by Mr. Otto Goldschmidt, Mr. Malcolm Lawson, Dr. Monk, and Mr. Walter Parratt, who has undertaken the choral music for the new drama. The proceeds of the performances will be given as a contribution towards a University Endowment fund, with the object of enabling King's College and University College, London, to extend and cheapen the higher collegiate education, with a view to qualify them for the functions of a Teaching University.

The Plastic Decoration and Papier Mache Company, of Wellington-street, Strand (formerly Bielefeld's), have removed their factories from Staines to more commodious premises situated in Market-road, Caledonian-road, N. The offices still remain in Wellington-street.

Brick and Masonry Arches.—At the last meeting of the Liverpool Engineering Society, Mr. Coard S. Pain, Assoc. Inst. C.E., President, in the chair, a paper on "Brick and Masonry Arches" was read by Mr. A. Wharton Metcalfe. The author said his object in bringing the paper before the Society was to give and contrast the empirical and theoretical modes employed in the design of arches, and also by presenting certain tables derived from the general equation to the equilibrium curve to illustrate the great advantage of the latter mode. By means of these tables the construction of the true curve of an arch, when designing a bridge, became an easy matter. The author also considered briefly the mechanical and graphical means for drawing the linear arch, and gave tables derived from actual examples prepared in the office, and calculated from the general equation to the linear arch. In dealing with such practical questions as the relative merits of brickwork and masonry in arches, and the systems of constructing the same, such as the ring and bonded methods, some valuable information was given, derived from the practice and experience of Mr. Charles Richardson, the engineer to the Severn Tunnel. The recent developments of long submarine tunnels have lent additional importance to the question of the relative merits of bonded brickwork and of brickwork built in rings; this, and its bearing upon the curves of arches subjected to water pressure from without, was discussed. In conclusion, the importance of the subject was strongly urged, and more especially so as the recent movement in favour of ironwork in the place of brickwork and masonry was considered to be hardly reasonable when the quality, hardness, and durability of bricks now made has been taken into consideration, as well as the economy resulting from their use.

A New Clock.—The parish church of Alveston, Gloucester, by the liberality of Mr. Edward Bissh, is about to be fitted with a turret clock by Mr. J. W. Benson, of Ludgate-hill. It has a copper dial of 4 ft. diameter, striking the hours and quarters, and is reported to be an exact timekeeper.

PRICES CURRENT OF MATERIALS.

TIMBER.	£. s. d.	£. s. d.
Greenheart, B.G. ....ton	6 10 0	7 10 0
Teak, E.I. ....load	12 10 0	15 10 0
Sequoia, U.S. ....ft. cube	0 2 4	0 2 6
Ash, Canada ....load	3 0 0	4 10 0
Birch ,, ...	3 0 0	4 10 0
Elm ,, ...	3 10 0	4 15 0
Fir, Dantsic, &c.	1 10 0	4 10 0
Oak ,, ...	3 0 0	5 0 0
Canada	5 10 0	6 10 0
Pine, Canada red	3 0 0	4 0 0
,, yellow	3 0 0	5 0 0
Lath, Dantsic ....fathom	3 10 0	5 0 0
St. Petersburg	4 0 0	6 0 0
Wainscot, Riga....log	2 15 0	4 10 0
,, Odessa, crown	3 12 6	3 15 0
Deals, Finland, 2nd and 1st...std. 100	7 10 0	8 10 0
,, 4th and 3rd	6 0 0	7 10 0
Riga	6 0 0	8 0 0
St. Petersburg, 1st yel.	9 0 0	14 0 0
,, 2nd ,, ...	7 0 0	8 15 0
,, white	7 0 0	10 0 0
Swedish....	6 0 0	15 0 0
White Sea	7 0 0	17 10 0
Canada, Pine 1st	17 0 0	30 0 0
,, 2nd	12 0 0	17 0 0
,, 3rd, &c.	6 0 0	10 0 0
,, Spruce 1st	8 0 0	11 0 0
,, 3rd and 2nd	5 0 0	7 10 0
New Brunswick, &c....	5 0 0	7 0 0
Battens, all kinds	4 0 0	12 0 0
Flooring Boards, sq. 1 in.—Prepared, first	0 9 0	0 13 0
Second	0 7 6	0 8 6
Other qualities	0 5 0	0 7 0
Cedar, Cuba....foot	0 0 3½	0 0 4
Honduras, &c.	0 0 3	0 0 4
Australian	0 0 2½	0 0 3
Mahogany, Cuba	0 0 5	0 0 7½
St. Domingo, cargo av....	0 0 5	0 0 7½
Mexican ,, ...	0 0 3½	0 0 4½
Tobasco cargo av.	0 0 4	0 0 6½
Honduras cargo av.	0 0 4½	0 0 6½
Maple, Bird'seye	0 0 7	0 0 9
Rose, Rio ....ton	7 0 0	18 0 0
Bahia....	6 0 0	14 0 0
Box, Turkey	5 0 0	18 0 0
Satin, St. Domingo .... ft.	0 0 0	0 0 0
Porto Rico	0 0 0	0 0 0
Walnut, Italian	0 0 4	0 0 5

METALS.		
IRON—Pig in Scotland ....ton	1 19 7	0 0 0
Bar, Welsh, in London....	4 15 0	5 0 0
,, ,, in Wales	4 7 6	4 10 0
,, Staffordshire, London	5 15 0	7 0 0
Sheets, single, in London....	7 10 0	9 0 0
Hoops ,, ...	6 5 0	7 5 0
Nail-rods ,, ...	5 15 0	7 0 0
COPPER—		
British, cke. and ingt. ....ton	43 0 0	44 0 0
Best selected	44 0 0	45 0 0
Sheets, strong....	50 0 0	0 0 0
,, India	48 0 0	48 10 0
Australian	45 0 0	46 0 0
Chili, bars	40 12 6	41 0 0

METALS (*continued*).	£. s. d.	£. s. d.
YELLOW METAL....lb.	0 0 4½	0 0 4½
LEAD—Pig, Spanish	13 7 6	0 0 0
English, com. brands	13 15 0	0 0 0
Sheet, English	14 12 6	14 15 0
SPELTER—		
Silesian, special ....ton	14 17 6	15 2 6
Ordinary brands	14 12 6	14 17 6
TIN—		
Banca	0 0 0	0 0 0
Billiton	0 0 0	0 0 0
Straits	92 15 0	93 5 0
Australian	92 17 6	93 10 0
English ingots....	98 0 0	0 0 0
ZINC—		
English sheet ....ton	17 0 0	17 15 0

OILS.	£. s. d.	£. s. d.
Linseed ....ton	20 10 0	20 17 6
Cocoanut, Cochin	29 0 0	30 0 0
Ceylon	26 0 0	0 0 0
Copra....	0 0 0	0 0 0
Palm, Lagos	26 0 0	0 0 0
Palm-nut Kernel	23 10 0	0 0 0
Rapeseed, English pale....	23 5 0	23 10 0
,, brown	21 15 0	0 0 0
Cottonseed, refined	17 0 0	18 10 0
Tallow and Oleine	25 0 0	40 0 0
Lubricating, U.S.	6 0 0	10 0 0
,, Refined	8 0 0	13 0 0
TURPENTINE—		
American, in cks. ....cwt.	1 9 6	1 10 3
TAR—Stockholm ....brl.	0 19 0	0 19 6
Archangel....	0 12 0	0 12 6

CONTRACTS AND PUBLIC APPOINTMENTS.

Epitome of Advertisements in this Number.

CONTRACTS.

Nature of Work, or Materials.	By whom required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
Works and Materials	St. Giles's Brd of Wks.	G. Wallace....	March 8th	ii.
Supply of Quebec Yellow Pine....	Great Western Ry. Co.	*Official*	March 9th	ii.
Portland Cement, Ballast, Sand, &c.	Chelsea Vestry....	G. R. Strachan....	do.	ii.
Wood Paving Blocks....	do.	do.	do.	ii.
Collection of House Refuse	West Ham Local Brd.	— Horn	do.	ii.
Works, Repairs, and Materials....	War Department....	*Official*	do.	ii.
Additional Passing Places	South London Tramways Company....	J. G. L. Stephenson ...	March 11th	xviii.
Alterations at Workhouse School	Guardians of St. Mary, Islington	Wm. Smith	do.	xviii.
Works and Materials	War Department....	*Official*	March 12th	ii.
Underground Urinals, &c.	Com. of Sewers....	do.	do.	ii.
Stoneware Pipe Sewers	Ramsgate Town Council	W. C. Barley....	do.	xviii.
Painting, &c., Works	Met. Asylums Board ...	*Official*	March 13th	xviii.
Works and Materials	Bermondsey Vestry ...	do.	March 15th	xviii.
Enlarging Goods Warehouse....	Lon. & N. W. Ry. Co.	S. B. Worthington	March 16th	ii.
King's-road Improvements....	Brighton Town Council	*Official*	do.	xviii.
Paving Footways	Greenwich Bd. of Wks.	do.	March 17th	xviii.
Guernsey Granite and Flints	Mortlake Highway Brd.	J. Medworth....	March 19th	xviii.
Tar Pavement....	do.	do.	do.	xviii.
New Roof over Machine House	Darwen Paper Mill Co. Limited	*Official*	do.	ii.
Additions to Parcel Post-Office	Com. of H.M. Works...	do.	March 22nd	ii.
Sewerage Works	Colne and Marsden L. B.	H. Bancroft	March 29th	xviii.
Tower Bridge.—Contract No. 1	Bridge House Estates Committee	J. W. Barry	do.	ii.
Sewerage Works, &c.	Com. of Sewers, Lincoln	H. L. D. Marsden	April 1st	xviii.
Wood Carriageway, with York Stone Footways, &c....	Met. Board of Works	*Official*	do.	ii.
Residence and Stabling, Great Clacton		Alf. Broad	Not stated	ii.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.	Page.
Building Surveyor....	Eastbourne Corporation	156*l.*	March 22nd	xvi.

TENDERS.

BRENTWOOD.—For additional bathing and lavatory accommodation at the Brentwood Schools, for the Guardians of the Hackney Union:—

Winter, Brentwood....	£183 0 0
Wood, Chelmsford	142 0 0
R. Seed, Dartmouth Park-hill*	110 0 0
Norris & Leeke, Upper Holloway	105 0 0

* Accepted.

BROCKLEY.—For the erection of two shops at the corner of Brockley and Shardeloes roads, Brockley. Mr. James Webster, architect, Doughty-street:—

A. C. Hoile (accepted)	£1,325 0 0

COLCHESTER.—For carpenter's, joiner's, ironmonger's, plumber's and glazier's work to cottages, Wimpole-lane, Colchester, for Mr. John Bare. Mr. G. H. Page, architect, Trinity-chambers, Colchester:—

Clark	£168 16 0
Sansom	166 0 0
Ambrose (accepted)....	165 0 0

CRANLEIGH.—For residence at Cranleigh, Surrey. Mr. George Lethbridge, architect. Quantities supplied by Mr. C. H. Goode:—

Mitchell Bros.	£4,550 0 0
Stanton	4,110 0 0
Holden....	3,998 0 0
Colls & Son....	3,996 0 0
Scott....	3,348 0 0
Harris & Wardrop....	3,235 0 0
Adcock....	3,190 0 0

DORKING.—For sewerage outfall works, for the Dorking Local Board. Messrs. Smith & Austin, engineers, Hertford:—

Contract No. 2.

J. W. & J. Neave, Leytonstone	£3,225 0 0
Leonard Bottoms, Batterses....	2,958 0 0
J. Harrison, Brighton	2,606 5 0
Wm. Nicholls, Wood Green....	2,563 18 6
E. Peill & Sons, Bromley, Kent	2,533 17 5
Mark Putney, Dorking	2,510 0 0
John Mackay, Southsea	2,422 8 0
J. Edmondson, Edmonton....	2,298 14 6
C. Killingback, London	2,203 6 9
Wm. Cunliffe, Barking (accepted) ...	1,970 10 0

Contract No. 3.

E. Peill & Sons, Bromley, Kent	4,224 12 6
J. W. & J. Neave, Leytonstone	4,113 0 0
J. Harrison, Brighton....	3,915 9 10
J. Mackay, Southsea	3,853 10 0
Mark Putney, Dorking	3,794 16 0
Leonard Bottoms, Batterses....	3,769 0 0
C. Killingback, London	3,431 16 6
Wm. Nicholls, Wood Green....	3,310 6 6
J. Edmondson, Edmonton....	3,288 3 0
Wm. Cunliffe, Barking (accepted)...	3,261 0 0

DAVENTRY.—For the erection of house and stabling, for Mrs. Hewitt. Mr. J. B. Williams, architect, Drayton and Daventry. Quantities by Messrs. Henry Cooper & Sons, Maidenhead and Reading:—

House.

Green Bros.	£3,525 0 0
Martin....	3,450 0 0
Cosford	3,395 0 0
Parnell & Sons	3,444 0 0
Gee	3,195 0 0

Stabling.

Cosford	537 0 0
Green	525 0 0
Martin	520 0 0
Parnell & Sons	474 0 0
Gee	449 0 0

EAST GRINSTEAD.—For additions and alterations to Bramblehurst, and rebuilding stabling at Forest-row. Messrs. N. S. Joseph & Smithem, architects:—

Phillipson, London	£3,502 0 0
E. Conder, London	2,587 0 0
Mansfield & Son, Tunbridge Well s...	2,060 0 0
Waters, Forest-row (accepted)	2,049 0 0

FULHAM.—For rebuilding old malthouse, Stamford Bridge, Fulham, for Mr. J. Bowden:—

H. Smith....	£1,278 0 0
Stone	1,260 0 0
W. H. Smith	1,212 0 0
J. Grover & Son	1,178 0 0
Prestige & Co. (accepted)	1,070 0 0

GRAYS (Essex).—For the completion of eight shops, High-street, Grays. Mr. J. H. Churchyard, surveyor, Bishopsgate-street:—

H. J. Carter, Grays (accepted)	£2,290 0 0

GRAYS (Essex).—For manager's house, for Messrs. Brooks, Shoobridge, & Co. Mr. E. C. Allam, architect:—

H. J. Carter, Grays (accepted)	£864 0 0

HIGHGATE.—For alterations and additions to St. Aloysius's School, Hornsey-lane. Mr. Albert Vicars, architect, Strand:—

T. Heath	£3,796 0 0
Grover & Son....	3,564 0 0
Patman & Fotheringham	3,473 0 0
Kelly & Son (accepted)	3,375 0 0

ISLINGTON.—For the supply of six water-vans and two water-carts, for the Vestry of St. Mary, Islington. Mr. J. P. Barber, surveyor:—

E. H. Bayley, Newington-causeway ...	£378 0 0
J. & W. Rendall, Kingsland....	290 0 0
Glover & Sons, Warwick	288 0 0
Bristol Wagon Works	284 0 0
J. Smith & Son, Wolverhampton	259 5 0
East Yorkshire Cart and Wagon Company, Beverley (accepted).....	258 15 0

ISLINGTON.—For alterations and additions to the King's Arms, Liverpool-road, for Mr. W. L. Harris. Mr. H. Hardwicke Langston, architect. Quantities by Mr. F. H. A. Hardcastle :—

W. Smith & Son	£1,689 0 0
Faulkner	1,445 0 0
Ridout	1,427 0 0
Langmead & Way	1,425 0 0
S. Godman	1,395 0 0
Brown & Harris	1,327 0 0
Stimpson & Co.	1,363 0 0
Mattock Bros.	1,255 0 0
Harris & Wardrop	1,253 0 0
Exton	1,237 0 0

ISLINGTON.—For the supply and fixing of twenty street water-posts, and the service-pipes and fittings connected therewith, for the Vestry of St. Mary, Islington. Mr. J. P. Barber, surveyor :—

	Plan No. 1.	Plan No. 2.
Simpson & Co., Pimlico	£417 0 0	£423 10 0
Chapman & Reid, Holloway	387 1 8	415 5 0
Beck & Co., Southwark	371 0 0	374 5 0
J. & F. May, High Holborn	367 0 0	361 0 0
F. Bird, Great Castle-street, Regent-street	318 10 0	349 0 0
Tylor & Sons, Newgate-street*	322 10 0	318 18 4
Blakeborough & Sons, Brighouse	287 6 8	287 5 0

Plan No. 1—Lead service-pipes. Plan No. 2—Iron ditto.
* Accepted.

LONDON.—For pulling down the premises, Nos. 43 to 63, Euston-buildings, George-street, Euston-road, and rebuilding seven dwelling-houses, for Mr. Thomas Hughes. Messrs. Karslake & Mortimer, architects :—

N. Lidstone	£10,197 0 0
G. H. & A. Bywaters	9,885 0 0
L. H. & R. Roberts	9,829 0 0
T. H. Adamson & Sons	9,817 0 0
W. Scrivener & Co.	9,584 0 0
E. Lawrance & Sons	8,983 0 0
Patman & Fotheringham	8,973 0 0

LONDON.—For stabling at Gayford-road, Starch-green, for the London General Omnibus Company, Limited, under the superintendence of Mr. G. T. Lanham. Quantities by Mr. A. J. Bolton :—

North Bros.	£2,490 0 0
Roberts	2,450 0 0
Lyford	2,435 0 0
Watkins & Co.	2,399 0 0
Richens & Mount	2,340 0 0
Hack	2,284 0 0
Garrud	2,272 0 0
Parker	2,239 0 0
Knight	2,100 0 0
Toms	2,069 0 0
Hunt	2,054 0 0
Haynes	2,050 0 0
Mark Manley	1,937 0 0

LONDON.—For constructing foundations and erecting basement story to Nos. 14, 16, and 18, Brook-street, Hanover-square. Messrs. N. S. Joseph & Smithem, architects :—

Ashby Bros.	£238 0 0
J. T. Chappell	487 0 0
W. Shepherd	449 0 0
W. Hearn & Co.	403 0 0
Patman & Fotheringham	373 0 0

LONDON.—For repairs and restorations to 55 and 56, Aldermanbury. Messrs. Heaps, Son, & Neave, surveyors :—

Oatley	£217 0 0
Forest	201 13 0
Johnson & Co.	193 15 0

MARGATE.—For alterations and additions to the Asylum for the Deaf and Dumb. Mr. Arthur R. Mullins, architect, London :—

Brown & Son, Margate	£15,923 10 0
Deane, Deal	15,598 0 0
Shrubsole, Faversham	15,333 0 0
Perry & Co., London	15,024 0 0
Rider & Son, London	14,920 0 0
Downs, London	14,910 0 0
Brass & Son, London	14,900 0 0
Jarrett, Croydon	14,787 0 0
Paramor, Margate	14,718 0 0
Prestige & Co., London	14,531 0 0
Chappell, London	14,498 0 0
Lawrence, London	14,303 0 0
Elliott, Newbury	13,944 0 0
Deane, Walmer	13,694 0 0

SHOREDITCH.—For additions and alterations to the workhouse laundry at Shoreditch Workhouse, for the Guardians of the Poor of the parish of St. Leonard, Shoreditch. Mr. J. Wallace Pegge, engineer :—

G. W. Pratt & Co.	£350 0 0
Walter Jones	340 0 0
Manlove, Alliott, Fryer, & Co.	327 10 0
Fraser & Fraser	310 0 0
Thomas Taylor	302 15 0
John & F. May	298 0 0
Bradford & Co.	297 0 0
Joseph Ivory	288 10 0
Edward Clements & Jeakes	283 10 0
Ayres & Co.	253 5 0
Thomas & Taylor (accepted)	240 0 0

[Engineer's estimate, 25*l.*]

WESTGATE-ON-SEA.—For the erection of stables in St. Mildred's-road, for Mr. Jarman (exclusive of stable-fittings, plumbing, painting, and glazing). Mr. A. Gordon Collins, architect, Westgate-on-Sea :—

G. Cloake, Westgate	£292 0 0
H. Bowman, Ramsgate	275 0 0

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